IMPACT OF CHANGES IN COGNITIVE STRUCTURE ON ATTITUDES AND PREFERENCES: THE VECTOR VERSUS THE FISHBEIN MODEL

By

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TABLE OF CONTENTS

Abstract of Dissertation Presented to the Graduate Council
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Experiments designed to test two competing models of cognitive structure, the Fishbein and the Vector models, were conducted. Subjects were administered communications treatments calculated to change beliefs about a target product attribute with the ultimate goal of changing their attitudes toward the product.

In many situations, the prediction for attitude change with either model is identical. Of particular interest are those cases which provide conflicting attitude change predictions. These special situations can be identified as those in which a change in the level of certainty of beliefs is attempted. The Vector model makes clear-cut, unequivocal predictions for attitude change, while the Fishbein model makes predictions which are conditional upon the sign of the affect value associated with the target attribute.

This research examines one type of belief change; a decrease in certainty. A pre-test post-test control group design with two blocks was run with blocks corresponding to each affect type. The dependent measure of attitude was taken in the form of the evaluative dimension of the semantic differential.

Although there are some methodological problems connected with this research, there is evidence (not at a statistically significant level) which can be interpreted as being supportive of the Vector model's predictions. When the data set was cut to include only those subjects for whom the manipulation was successful, changes recorded in the dependent measure of attitude stood consistently in the direction predicted by the Vector model and in direct opposition to the predicted direction of attitude change suggested by the Fishbein model.

Extensive re-analyses were conducted to document results and diagnose problem areas. Proposals for alternative methodological approaches to the study of this question are made which should allow a stronger test in replication.

CHAPTER I
INTRODUCTION

Relevance of Attitude Research for Marketers

The purpose of this research is to study the processes by which attitudes can be changed. Historically, attitude has been a fruitful construct for social psychologists and marketing practitioners alike. The process by which attitudes are originally formed and subsequently modified is widely considered to be of commercial significance to marketers of consumer products.

The key functions of attitude to marketing researchers are the predictive, the diagnostic, and the surrogate (Lunn, 1971). An amplification of these follows:

(1) The predictive function is performed by attitude to the extent that the manager is able to predict sales of his product in the short run based on consumer attitudes or preferences. However, if the manager desires solely to predict sales many other types of variables may be more efficient; easier to obtain or cheaper (demographics, etc.).

(2) In the diagnostic type of situation efficiency of measurement becomes a less critical dimension and other considerations become salient. That is, in the interest of understanding a process concessions may be required in the degree of predictive ability. Obviously, though, if the level of predictive power can remain unaffected while increasing diagnostic power it would be most

desirable. Unfortunately, the choice between prediction and diagnosticity usually requires some trade-offs.

The diagnostic function is preformed by attitude in that it offers the manager insights into why his product is or is not performing well in the marketplace. For attitude to perform this diagnostic function it is necessary to assume that there is, in fact, a relationship between attutude and behavior. This relationship thus becomes a theoretical, rather than empirical, link between the consumer's covert mental processes and his overt market behavior.

(3) The status of attitude as a variable which intervenes between the reception of information from the environment and subsequent purchase behavior has led to the third function: the surrogate. To the extent that attitude is truly related to behavior, then changes in consumer purchase behavior which occur in response to manipulation of the marketing mix may be preceded by changes in consumer attitudes. The assumption being that situational or normative factors are static (Fishbein, 1972). In many situations marketing researchers can use attitude as a surrogate measure for sales by testing the proposed change in the marketing variable in a behavioral laboratory. This offers a much less costly alternative to a market study. This surrogate function of attitude has been used most extensively in research attempting to measure advertising effectiveness where a corollary benefit has been that ineffective campaigns never have the opportunity to exert any type of influence in the marketplace.

Plan for the Following Chapters

Since this research deals with an examination of some subtle distinctions between two multiattribute models of attitude, it is necessary to place the models involved in their broader theoretical context. This may best be accomplished by providing in a separate chapter a review of some important conceptual distinctions between the various multiattribute model branches.

In the third chapter descriptions of the properties of the Fishbein and Vector models will be more fully developed. This will include comprehensive discussions of the operational implications of the models and will culminate in the specification of some important research issues—areas in which the implications (predictions) of the models are in conflict.

The fourth chapter will specify the subset of the research issues discussed in chapter three which are the focus of this study.

Chapter five discusses the methodological options which were considered as competing approaches in this research.

Chapter six discusses the operational fine points involved in implementation of the chosen methodology. In addition, it covers all aspects of data collection, the statistical analysis and a description of the results.

Chapter seven draws the conclusions of the study and points out some potentially fruitful areas for future research.

The Appendices contain reproductions of the instruments employed and discussions of the various statistical measures and techniques which were used—including assumptions, properties, strengths and weaknesses.

CHAPTER II
OVERVIEW OF MULTIATTRIBUTE MODELS

The area of multiattribute modeling has received considerable attention in marketing in recent years. Basically, the study involves evaluation of or decisions among multiattributed alternatives. That is, among alternatives that have more than one salient aspect associated with them.

To facilitate discussion of this rather complex area a flowchart model of the relationships between the issues is provided (see Figure 1). The ensuing discussion begins with the assumption that the multiattribute models under discussion reflect choice among or evaluations of multiple stimuli by a single individual. This writer is of the opinion that this level of analysis reflects accurately the conceptual intent of the proponents of the major models and perspectives to be discussed. However, realizing that others may hold differing opinions, the implications of the models for cross-sectional analysis (particularly with regard to mathematical form) will be reviewed in the concluding section of this chapter.

The multiattribute area is viewed as being fundamentally divided on one issue: compensation. Essentially, can a favorable association on one attribute offset an unfavorable association on some other attribute or vice versa? Also, is the criterion variable unidimensional or multidimensional? That is, have the evaluations of the separate aspects of each choice object retained their individual

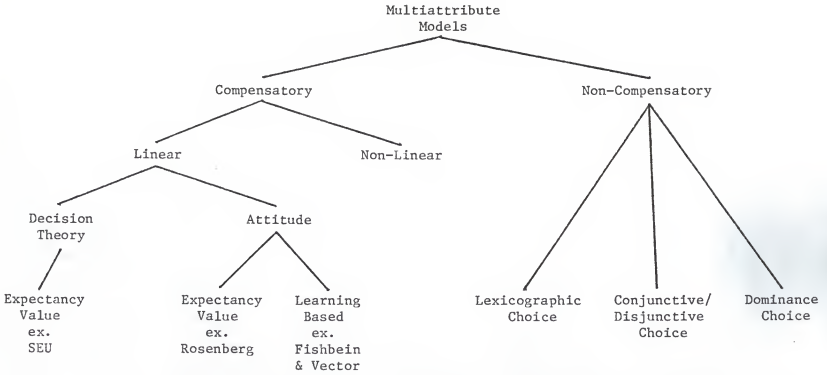


Figure 1

Multiattribute Models:
Intra-individual Level Analysis

identity (multidimensional) or have they been combined and channeled into a mediating variable (unidimensional); for example, attitude?

Recently, considerable interest has been generated in the area of non-compensatory multiattribute models. Green and Wind (1973) provide an excellent review. In addition, Wright (1973) has stressed that consumers displaying non-compensatory decision processes will be differentially susceptible to promotional efforts depending upon the type of non-compensatory model used.

The Non-Compensatory Multiattribute Models

As previously mentioned Green and Wind (1973) provide an excellent review of these model forms. The following borrows heavily from their work.

Dominance Models:

Given the two profiles $x = (x_1, x_2, \ldots, x_m)$ and $x' = (x_1', x_2', \ldots, x_m')$ x dominates x' if $U(x_j) \geq U(x_j')$ for all j AND $U(x_j^*) > U(x_j^*)$ for some j^* in X.

In general terms, the implication is that x will be preferred over x' if x is equal to or superior to x' on all attributes while at the same time being superior on at least one attribute.

Conjunctive-Disjunctive Models

As opposed to Dominance models, the Conjunctive-Disjunctive models are not employed to order a set of alternatives, instead they are used to dichotomize alternatives into "accept" or "reject" groups.

The Conjunctive Model:

Given non-empty subsets of X, X_1^*, X_2^*, . . ., X_m^*

(that is, acceptable attribute levels),

$x = (x_1, x_2, \ldots, x_j, \ldots, x_m)$ is valued only if

$x_j \in X_j^*$ for all j (j = 1, 2, . . ., m).

In general terms, alternative x is placed in the acceptable group if the choice alternative meets pre-established minimum criteria on all attributes.

The Disjunctive Model:

Given non-empty subsets of X, X_1^*, X_2^*, . . ., X_m^*,

(that is, superior attribute levels)

$x = (x_1, x_2, \ldots, x_j, \ldots x_m)$ is valued only if

$x_j \in X_j^*$ for some j (j = 1, 2, . . ., m).

In contrast to the conjunctive model, disjunctive models evaluate alternatives on the basis of their maximum levels rather than their minimum levels. That is, x is placed in the acceptable group if on one or more attributes which are considered crucial the alternative scores in excess of the cut point. In other words, to be placed in the acceptable group it is not necessary to score highly on all criteria if the alternative is superior on one or more crucial attributes.

Lexicographic Models

In the lexicographic format, processing of attribute score data is assumed to proceed sequentially. Alternative choices are ranked according to their standing on each salient attribute. Choice is

made attribute-by-attribute. The processing order of the attributes is by importance. The most important attribute is considered first. If one alternative is superior on the first attribute processing ceases and a choice is made. If there is a tie, the decision-maker proceeds to the second most important attribute. Processing continues successively through the attribute list until one choice alternative is judged superior.

The Compensatory Multiattribute Models

The other branch of the multiattribute model area (see Figure 1) is founded on the premise of compensation. That is, a low value on some attribute can be offset by a high value on some other attribute. It is maintained (Green and Wind, 1973) that all alternative choices can ultimately be described in terms of "single utility numbers" that are derived in such a fashion as to permit comparison between alternatives.

These "utility numbers" are unidimensional. It will be shown shortly that many of the hypothetical constructs popular in the psychological literature have been modelled using these assumptions.

Mathematical Forms

Compensatory models can be distinguished by the type of mathematical properties ascribed to them. The most popular model form in the psychological (and marketing) literature is the linear compensatory model. This is derived from the linear equation. The general form of a linear function is:

$$y = mx + b$$

where y = the dependent variable

b = a constant, the intercept

m = a constant, the slope

x = a variable, in this case an attribute level of an alternative

The preceding model is linear but not compensatory. The compensatory nature of a model becomes operative only when there are multiple attributes to consider. Thus, a linear conpensatory model is of the form

$$y = \sum_{i=1}^{n} m_i x_i + b$$

where y = the dependent variable

b = a constant, the intercept

m_i = a constant, the response of y to a one unit change in x_i

x_i = a variable, an attribute level of one of the alternatives

n = the number of salient attributes

It should be carefully noted that the linear compensatory model form described above does not provide for the possibility of any interaction between attributes within the attribute set.

Other model forms exist (an illustration follows shortly), but they have not been used frequently in the multiattribute area. This author believes that there are several reasons for the lack of sophistication in model forms in use. These include:

(1) Difficulty in interpretation of non-linear models (diagnostic problems).

(2) Lack of a current theoretical foundation to support their use in this area.

(3) High level of predictive success currently achieved by the linear models. This will be explored in greater detail when empirical results of the various models are discussed.

Perhaps an example given at this point will clarify the distinction between linear and non-linear models drawn earlier. For this purpose two alternative approaches to multiattribute compensatory non-linear forms are discussed (Schwartz, 1967).

First,

$$y = \sum_{i=1}^{n} m_i (x_i)^k + b$$

where y = the dependent variable

b = a constant, the intercept

m_i = a constant, the response of y to a one unit change in x_i

x_i = a variable, an attribute level of one of the alternatives

n = the number of salient attributes

k = where $k \neq 1$, the nature of the relationship between y and x_i

It should be clear to the reader that the linear compensatory multiattribute model described earlier is simply a specific case of the model described above. (That is, the case where $k = 1$.)

A second basic non-linear multiattribute form follows:

$$y = \sum_{i=1}^{n} m_i x_i + b$$

where y = the dependent variable

b = a constant, the intercept

m_i = a variable, the level of which is independent of the attribute

x_i = a variable, an attribute level of one of the alternatives

n = the number of salient attributes

One realistic application of the above model type would be to use it to represent an interaction of attributes; with m_i being the level of the alternative on a second attribute which must be considered simultaneously.

The Criterion Variable

Continuing on within the framework outlined earlier (Figure 1), there have been various theoretical concepts modelled which make use of the linear compensatory multiattribute model. For our purposes they have been grouped on the basis of what this researcher considers to be major differences in their theoretical perspectives. Because of their separate origins, it seems to make sense to distinguish between the Decision Theoretical or economic applications (Edwards, 1954) of this model form and the psychologically-based applications in the attitude area.

The Decision Theoretic Approach

Before proceding further to discuss the concepts and implications of utility theory it may be beneficial to review the following choice environments (Luce and Raiffa, 1957):

A. Riskless - Choice making under conditions of certainty where choice outcomes are known.

B. Risk - Knowledge of an objective probability distribution associated with each choice outcome.

C. Uncertainty - The decision maker can not assign objective probabilities to particular outcomes.

- partial ignorance: only subjective probabilities can be assigned.
- total uncertainty: no probability could reasonably be assigned.

Statistical Decision Theory is involved with situations demonstrating either risk or uncertainty. Riskless models would be trivial in the single attribute case. The decision maker would simply choose the alternative which generates the highest payoff. However, they become much more complex in the multiattribute case since different model or combinatorial assumptions can produce different judgements as to the payoff of various alternatives.

Indifference curve analysis has been used to graphically demonstrate the relationship between two variables (in terms of their interchangeability). A person is indifferent between quantities of two commodities if their utility (satisfaction, payoff) is equivalent. The underlying assumption of utility theory is that man strives to maximize his output (satisfaction) given his resources. In

indifference curve analysis this means that he will choose two commodities in the proportion described by the point where his budget line (resource constraint) is tangent to his utility curve (Haines, 1973). It is obvious that similar analyses of the utility of bundles of attributes (or commodities) in excess of two are possible although they cannot be represented as conveniently graphically.

Von Neumann and Morgenstern (1953) introduced the concept of uncertainty into utility theory. They maintained that if decision situations are extended to include choice among uncertain prospects and certain other presuppositions are satisfied, interval scaled utilities can be assigned to the various risky alternatives. Historically, the commodities themselves were considered to be the basic objects of utility rather than the attributes of the commodities. Then, Lancaster (1966) came forth with the idea of a consumer utility in which goods are assumed to be evaluated in terms of preferences for the attribute levels believed to underlie the goods. Thus, utility would not be derived from the goods directly, but instead would spring forth from the want-satisfying attributes of the goods. An illustration of this type of model is the additive utility model which follows:

$$U(x) = U_1(x_1) + U_2(x_2) + \ldots + U_m(x_m).$$

In this example the utility of an alternative is defined as being equal to the sum of the utilities of its parts. This conforms to the assumptions of the riskless environment described earlier. That is, the utility of each of x's parts (attributes) is assumed to be known (probability = 1.0). If the evaluator was uncertain as to

the relationship between x and any individual attribute utility it is possible that he could generate subjective probabilities or expectancies about x's possession of individual attributes. Edwards (1954) developed a model widely known as the subjective expected utility model for this type of situation. This model can be represented as:

$$SEU(x) = \sum_{i=1}^{n} SP_i \cdot U(x_i)$$

where $SEU(x)$ = subjective expected utility of alternative x

SP_i = subjective probability that object x possesses attribute x_i

$U(x_i)$ = utility of a salient attribute of object x

n = number of salient attributes of x

The model assumes that subjective probability and attribute utility are independent. Empirical results have suggested that this may not be valid.

Theorists have not chosen to formally label the SEU model as an expectancy-value model. The nature of expectancy-value models will be discussed in considerable detail when we explore the other branch (see Figure 1) of linear compensatory multiattribute models—those addressing the attitude concept. Suffice it to say for now that it has been suggested that the SEU model qualifies (Cohen, 1972). This judgement appears to be based on the following:

(1) SP_i is a mentalistic concept.

(2) U(x) can be construed as being capable of directing a form of behavior (choice).

(3) There is an implied means/end relation between choice of the object and the attribute utilities.

Attitude

It may be helpful at this point to distinguish between the concepts of attitude, belief and behavioral intention, since we will be using these terms in further discussion of the branches of the linear compensatory multiattribute attitude model area. Fishbein and Ajzen (1975) stated the relationship concisely:

> . . . the concept "attitude" should be used only when there is strong evidence that the measure places an individual on a bipolar affective dimension. When the measure places the individual on a dimension of subjective probability relating an object to an attribute, the label "belief" should be applied. When the probability dimension links the person to a behavior, the concept "behavioral intention" should be used. (p. 13).

The second active branch of linear compensatory multiattribute models involves those models which address the attitude concept. According to Fishbein and Ajzen (1975, p. 6), "most investigators would probably agree that attitude can be described as a learned predisposition to respond in a consistently favorable or unfavorable manner with respect to a given object." However, they point out that although this definition would be acceptable to most researchers, its precise meaning is somewhat ambiguous. First, confusion arises as to the proper conclusion to be drawn about the nature of response consistency. According to Fishbein and Ajzen (1975, p. 6), "At least three types of consistency can be distinguished. First, a person may be observed to consistently perform the same response . . . in the presence of a given stimulus object." This could be labeled "stimulus-response" consistency. Another "interpretation concerns

itself with the degree of consistency between different responses with respect to the same object" (p. 6). According to Fishbein and Ajzen "whatever the responses that are elicited by the object, they should be consistent with one another" (p. 6). As in the case of stimulus-response consistency, response-response consistency does not discriminate between attitude and other concepts such as drives, motives, etc. The third type of response consistency discussed by Fishbein and Ajzen is "evaluative consistency." This is concerned with situations where multiple behaviors occur in conjunction with a given stimulus over time. A person may perform various behaviors with respect to an object on different occasions. The overall degree of favorability of these behaviors may remain roughly the same. If it does, these responses could be said to possess evaluative consistency. It is important to note that, once again, the consistency of these responses could be defined in terms of concepts other than attitude. However, it is generally agreed that this affective consistency is the distinctive property of attitude which permits differentiation of the attitude concept from other concepts (Osgood, Suci, and Tannenbaum, 1957).

Another important aspect of this definition of attitude is the meaning of the term "predisposition." Employing the same response classificatory schema discussed earlier some general conclusions can be drawn about the nature of predispositions (Fishbein and Ajzen, 1975). First, if we define response predisposition as stimulus-response consistency, we would expect that knowledge of a person's attitude toward the object would permit prediction of specific behaviors. Under the response-response interpretation we would predict

that an individual would be predisposed toward performing a class of behavior at any given time; all of which are favorable or unfavorable in relation to the object. Finally, under evaluative consistency, a person is seen as being predisposed to behave in a consistently favorable or unfavorable way toward the object over time.

There is increasing recognition that predispositions toward objects are influenced by personal experiences. According to Fishbein and Ajzen (1975, p. 10), "it is widely accepted that residues of this experience influence or modify behavior of the organism."

Theory Branches of Linear Compensatory Multiattribute Attitude Models

The literature in this area suggests that a distinction can be drawn between popular versions of these multiattribute attitude models based upon their theoretical origins. A dichotomy can be established based on the following:

(1) Learning Based Models, and

(2) Cognitive, motivationally-based models of the expectancy-value type.

Learning Based Models

Learning based models rely upon the principles of conditioning to handle attitude formation and change. The process by which a particular response becomes associated with a stimulus is known as classical conditioning. [See Figure 2 (Fishbein and Ajzen, 1975)]

Without any prior learning the unconditioned stimulus (UCS) elicits an unconditioned response (UCR). According to the conditioning paradigm a new stimulus is introduced to the situation which

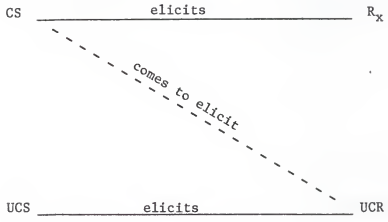


Figure 2

Classical Conditioning Paradigm

does not yet have any relationship to the UCS and which may exhibit a response of its own R_x. When the CS is constantly paired with the UCS, it eventually comes to elicit some of the response characteristics which earlier were only connected with the UCS.

The Fishbein Model's Behavioral Tradition

Fishbein (1963) proposed a model of the attitude concept which is faithful to the conditioning process described above. In Fishbein's view, attitude toward an object is a function of beliefs which a person holds regarding the object and the evaluative aspects of those beliefs. The process of attitude formation is "associative" in nature. That is, attributes become associated with the attitude object through a conditioning process. If a single attribute defines an object then the affect (evaluation) associated with that attribute defines the attitude toward the object. In cases of less than perfect certainty, the evaluation of the attribute would be greater than the attitude toward the object. The notion of less than perfect certainty is handled by the "belief" variable. According to Fishbein (1967a, p. 389), "any belief about an object can be defined in terms of the 'probability' or 'improbability' that a particular relationship exists between (the attribute and the attitude object)."

If one salient attribute can be associated (learned) by conditioning to an attitude object, it seems reasonable that multiple salient attributes can also be conditioned to the object. Fishbein views the relationship between the individual attribute evaluations and attitude as summative. In summary, Fishbein (1967a) stated that according to this theory:

> Attitudes have been viewed as learned mediated evaluative responses, and beliefs about an object have been viewed in terms of the probability (or strength) of stimulus-response associations. (p. 390)

The idea of attitude as a mediating evaluative response builds upon earlier work by Doob. Doob (1947) defined attitude as a learned, implicit anticipatory response. He viewed attitude as an invisible response to a stimulus which could also serve as a stimulus to an overt response. He also made explicit the assumption that any response which can be learned to an overt stimulus can also be learned to an implicit response. His model can be represented as:

$$S \rightarrow r \ldots s \rightarrow R$$

where r . . . s represents an attitude, the implicit response.

The learning process involved in the Fishbein model perhaps can best be understood by way of an example. See Figure 3. In this illustration we can see the process of attitude formation as explained by classical conditioning. Initially, characteristics (or attributes), the unconditioned stimuli (UCS), which have prior learned evaluative responses associated with them, called unconditioned responses (UCR), are perceived in the spatial and temporal presence of some object, the conditioned stimulus (CS). This CS is foreign to the actor, that is, the individual has not yet formed any evaluative response to it. This process of attitude formation (regarding the CS) may be gradual. That is, various attributes (UCS) of the object may become salient over a period of time. In the simplest case, where only one attribute of the object has been perceived by the actor as salient, the mediated evaluative response to the object (attitude) is simply a function of

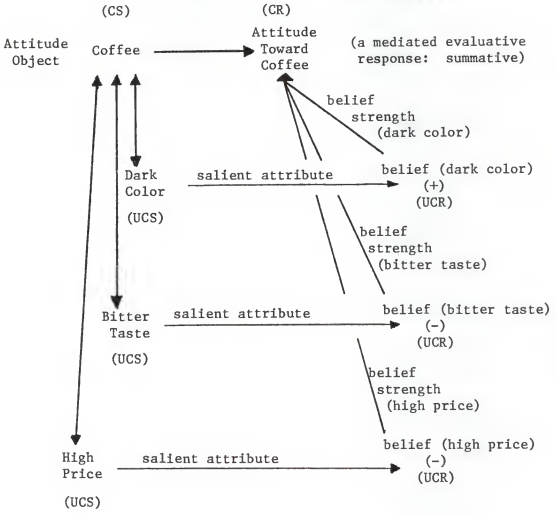


Figure 3

Process of Attitude Formation (Classical Conditioning)

the affect of the attribute (UCR). This is not to say that the degree of affect of the object will exactly coincide with the degree of affect of the attribute. This may be the case, but another factor enters. This additional factor, called "belief," determines the proportion of the affect of a given attribute which enters the attitude judgement.

Ahtola (1977a) has indicated that his belief "weighting" of individual attribute evaluations can be conceptualized as a kind of filtering process. Fishbein's operationalization of belief is somewhat different. His belief measure incorporates a "balance" notion. Operationally, the Fishbein model gives prominence to affect which is either highly associated with the stimulus or highly disassociated with the stimulus. This is contrasted with the Vector model where only associations with positively evaluated attributes can enhance attitude. Fishbein maintains that disassociation from negatively evaluated attributes can contribute as positively to attitude as association with positively evaluated attributes, and vice versa.

The conditioning process just described can be generalized to objects with multiple salient attributes (UCS). It is important to note that in cases where new attributes are added to the actor's salient set of attributes for the object over time changes in belief strength associated with UCR acquired earlier may occur. This may result from the occurrence of "socratic effect" (Wyer, 1974).

Attitude modification or change is explained by the formation of a new probabilistic association (belief) about the object (CS) involving addition of another salient attribute or by:

(1) Change in the strength of the probabilistic association (belief strength), or

(2) Change in the magnitude of affect associated with an attribute (UCR).

Actual specification of Fishbein's model and explanation of the operationalization of its measures will be discussed in the following chapter.

The Vector Model's Behavioral Tradition

The Vector Model of Preferences (Ahtola, 1973) was based on the same theoretical foundation used in the Fishbein model. Key differences, other than measurement issues, involve the way attributes (or unconditioned stimuli) relate to the attitude object. These differences dealing with the conceptualization of the belief variable were discussed in the preceding section.

Borrowing a page from decision theory this model speculates that the mediated evaluative response (attitude) should include an exhaustive assessment of the relationships between the various salient attributes (UCS) and the attitude object (CS). This desire stemmed from the empirical observation that:

(1) one must know the amount of an attribute before one can determine the affect associated with it (affect is not always constant for all levels of an attribute) (see Figure 4), and

(2) people often possess less than perfect confidence (certainty) in many judgements they make concerning the attributes of an object. Thus, the fact that less than perfect certainty (belief = 100%) is associated with a particular attribute concept gives rise to a desire

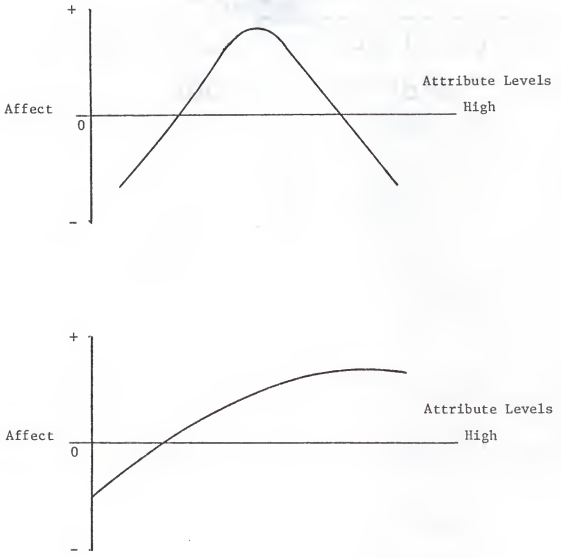


Figure 4

Illustrations of Some Response Functions (Affect)
for Various Attribute Levels

to discover what other attribute levels have positive (non-zero) belief-strengths associated with them. (It is assumed that these should also affect attitude).

The model of the conditioning process under which attitudes are presumed to be formed with the Fishbein model (see Figure 3) is entirely compatible with the conditioning process underlying attitude formation in the Vector model. The main differences lie in the fact that many more unconditioned stimuli are paired with the attitude object and the absence of the "balance notion" in belief measurement employed in the Fishbein model. In reference to the former point, there should be a (UCS) for each salient level of an attribute as contrasted with the Fishbein model illustration in which there was a single (UCS) per attribute.

Formal specification of the Vector model and discussion of its operational implications will be performed in the following chapter.

Expectancy-Value Models

Atkinson (1964) defines expectancy-value motivation theories as the following:

> The strength of a tendency to act in a certain way depends upon the strength that the expectancy will be followed by a given consequence and the value of that consequence to the individual. (p. 274).

These theories of motivation differ from the Hullian behavioristic perspective in that these theorists have adopted a mentalistic, cognitive view of man. Important in this theoretical area is the notion of perception. That is, "objective" reality is of secondary importance to the actor's subjective perception of his environment. The view is one of a thinking man striving (almost in the economic

sense) to maximize his outcomes. The types of variables employed to explain behavior are in the cognitive domain.

One of the prime movers in this perspective was Kurt Lewin. Lewin (1935) maintained that behavior must be analyzed in terms of the psychological field operant for the individual at the time the behavior occurs. He believed that the proper temporal horizon is the present and that past events influence behavior indirectly, only to the extent that they may influence the person's current perception of his environment. The term he coined to represent this notion is "life space." Lewin defined behavior as movement within the life space. He proposed the concept of "force" to explain why a person would move within his life space. In a situation in which only one force is present, providing that it is a positively valued force, his theory predicts that the person will locomote to that region in his life space. However, according to Lewin it is likely that there will be multiple forces operating on the person at any point in time in his life space. To explain behavior in this complex environment Lewin introduced the idea of "resultant force." This is defined as the net force resulting from a field of forces. This resultant force specifies the object (goal) of behavior. Next, Lewin proposed the concept of "potency." Potency may be viewed as a factor influencing the effective strength of competing forces. Even if a goal is very attractive it will not elicit behavior if the potency of the situation to which the goal is linked is very low. By definition, the combined potency of all situations in which an individual is simultaneously involved is equal to one. The potency of any individual situation thus ranges from zero to one. Potency can be defined as the influence

of one situation relative to all simultaneously acting situations. Finally, Lewin introduced the concept of "valence" to help explain behavior which either leads the person toward or in the opposite direction of the goal object. Regions which have a positive valence are defined as goal objects for the person (approach behavior), while regions which have negative valence are viewed as aversive (avoidance behavior). In general, people move toward (+) valences and away from (-) valences. Lewin proposed that the variables are related multiplicatively as follows: Force = Valence x Potency.

Tolman (1955) approached the question of motivation by proposing that man is continually exposed to different physiological and environmental cues and that these plus experience combine to result in three major variables which intervene between the observable antecedents of behavior (such as environment, physiological stimuli), and the behavioral act. These intervening variables are mentalistic concepts. They include such things as goal demand level, expectancy of attaining the goal and outcome evaluation. Expectancies are defined as being some function of the individual's past experiences. Simply stated, the expectancy of a particular goal is an increasing function of the number of past experiences in which a particular behavior resulted in this outcome. Goal value for Tolman is closely related to the concept of valence described by Lewin. As the reader will recall, the likelihood of behavior toward the goal is heightened as its valence is increased. Practically speaking, we can conclude that a person would choose to behave first to satisfy the outcome for which he currently has the highest demand level. This variable handles the same issues as the learning theory concepts of deprivation and

satiation in that the following are accounted for in determining the magnitude of the Performance Vector (which is closely related to behavioral intention):

(1) No matter how large the expected value of a particular action outcome we can expect satiation to occur after repeated performance of the behavior. Satiation is reflected in a decreasing value of the demand level variable over behavioral repetitions.

(2) Conversely, with a lengthening time interval since last performance of a behavior we can expect the demand level to increase. This can be explained by the concept of deprivation.

Thus, we might expect to observe the following phenomenon. A person is very likely to perform that behavior for which he has the highest current demand level first. Given this information the model predicts that the person, when faced with multiple modes of resolution of his high demand level, will behave in the fashion which will generate the highest expected value.

The relationship between Tolman's variables and behavior can be expressed as:

Performance Vector	=	Expectation of Achieving a Desired Outcome	X	Value of the Outcome	X	Demand Level for a Given Outcome

The mulitplicative relation indicates that the absence of any component [independent variable(s) = 0] generates a performance vector of zero. Also implicit in this relationship is the idea that if there are multiple outcomes to a particular act the product of the

three independent variables would be summed over each of these outcomes to determine the impulse to act.

The relationship between expectancy-value models of motivation and attitude can be illustrated in terms of Tolman's model:

$$\text{Performance Vector} = \text{Expectation of Achieving a Desired Outcome} \times \text{Level of a Given Outcome (Value)} \times \text{Demand Level for a Given Outcome}$$

or

$$\text{Performance Vector} = \text{Attitude} \times \text{Demand Level for a Given Outcome}$$

If we view attitude as a predisposition to respond in a favorable or unfavorable manner we can conclude that the magnitude of the Performance Vector (behavioral tendency toward an act) will be highest when there is a highly favorable attitude toward the act and there is a high level of need within the indivudual for the outcome of the act (a situational variable). That is, behavior would be a function of the attitude and the demand for a given outcome. "Alternative behaviors may be thought of as constituting a hierarchy based on their relative expected values (attitude), thus generating a set of behavioral tendencies for any given motive (demand level for a given outcome)" (Cohen and Ahtola, 1971, p. 4).

The Rosenberg Model

Rosenberg (1956) proposed a model which is theoretically consistent with the expectancy-value or "means-ends" orientation. It

is also consistent with a broad interpretation of The Functional Theory of Attitudes (Katz, 1960). The model:

$$A_o = \sum_{i=1}^{n} I_i V_i$$

where A_o = attitude toward an object

I_i = perceived instrumentality, the belief about the potential of the object for attaining or blocking the realization of valued state i

V_i = value importance, valued state i's importance to a person as a source of satisfaction

n = the number of valued states

Rosenberg's original conceptualization involved the use of abstract values, not actual product related attributes. The practical implication of this was addressed by Mazis, Ahtola, and Klippel (1974). They stated:

> While values might have limited usefulness (in predicting preferences) in product categories in which clear differences in (attributes) exist, they may be useful for product categories where brand differences are largely illusory. While Rosenberg's formulation was conceptualized around values, the model would appear equally valid using other cognitive elements, including product characteristics. (p. 4)

Key differences between the operationalization of the Fishbein and Rosenberg models include (Mazis, Ahtola, and Klippel, 1974):

(1) The Fishbein model measures the likelihood of the behavior (A_{act} model) resulting in a salient outcome, while,

(2) the Rosenberg approach measures <u>two</u> consequences of the behavior:

(a) how likely the behavior is to result in a particular outcome, and

(b) how likely the behavior is to result in blocking a particular outcome.

Further illustration of these differences is provided by Ahtola (1973):

> A given outcome may be quite improbable (low B_i) through the behavior in question but it also may not create an obstacle or hindrance to the achievement of that outcome later or by other means (which is what blocking means). That is, blocking goes beyond the mere improbability of outcome through a given behavior. For this reason, it could be argued that Rosenberg's I_i component has more discriminatory power than Fishbein's B_i (belief component). (p. 12)

A Sample of Marketing's Applications of Multiattribute Models

Wilkie and Pessemier (1973) provide an excellent review of marketing studies utilizing various operational forms of the multiattribute attitude model. The mathematical form of all the models reviewed is linear conpensatory. Specific issues investigated in their review are:

(1) Size of the attribute set and method of selecting attributes.

(2) Scaling of the "importance" variable—evaluation versus prominence.

(3) Operationalization of beliefs—does the measure of association contain pure cognitive or cognitive and affective aspects?

Although it is acknowledged in this article that the theoretical work of Rosenberg and Fishbein gave rise to the interest in the

marketing field in multiattribute attitude models, analysis of the results of the forty-two studies reviewed indicate that no true test of either the Fishbein or Rosenberg model had been conducted in marketing. An additional issue is that in all forty-two studies the effectiveness criterion of the multiattribute model employed was its ability to predict attitude (or preference). This was typically operationalized by computing the correlation between the model and an independent criterion measure. That is, the analysis was performed cross-sectionally.

In the same article, Wilkie and Pessemier also discuss some of the empirical work done on non-compensatory multiattribute models. They stated:

> Russ (1972) reports tests of several formulations of the lexicographic model which outperform the basic model in information processing tasks. Heeler, Kearney and Mehaffey (1973), in contrast, found the compensatory model superior to both conjunctive and disjunctive models in predictions of new product acceptances and rejections by supermarket buyers. Wright (1973) also found the linear model better than either conjunctive or disjunctive forms in tasks "reconstructing" brand belief systems, while non-linear models performed better for active information processing tasks. (Wilkie and Pessemier, 1973, p. 437).

One study in marketing by Tuck (1973) deliberately utilized methodology which was consistent with the measures proposed by Fishbein (1967a). Correlations between a Fishbein model measure of A_{act} and a criterion measure of the same construct in a field study in Great Britain for a beverage product were of the magnitude of .51 to .68. It is insightful to note that this study by Tuck was a replication of an earlier study performed in conjunction with the same beverage product. Correlations in the earlier study were much lower (approximately $r = .30$). Tuck attributes the improvement in

correlations found in the replication to more careful operationalization of measures. In the original study A_o (attitude toward the object) was correlated with A_{act} (attitude toward drinking the object).

An interesting series of articles appeared in the Journal of Marketing Research during 1972 which deal with some important theoretical and empirical issues in marketing's use of multiattribute attitude models. Two separate articles, which utilized the same data base, were published which purported to examine the predictive effectiveness of the Fishbein and the Rosenberg models.

Sheth and Talarzyk (1972) attempted to examine the components of the Rosenberg model in hopes of determining which component, perceived instrumentality or value importance, when considered separately, explained more variance in the criterion measure of attitude. Unfortunately, the operationalization of the measures used in this study was so unlike that of Rosenberg that the Sheth and Talarzyk study must be discounted as a test of Rosenberg model properties.

Bass and Talarzyk (1972), using the same data base as Sheth and Talarzyk attempted to test the hypothesis that measures specific to preference alternatives rather than more general measures such as those of socioeconomic and personality characteristics, would lead to successful predictions of brand preference. This study purported to examine the Fishbein model. However, the operationalization of measures was totally inappropriate to the Fishbein model.

Cohen, Fishbein and Ahtola (1972) responded to the Bass and Talarzyk and Sheth and Talarzyk publications described earlier. A concise statement of the theoretical premises underlying the Rosenberg

and Fishbein models was made. Later, contrasts between the operationalizations of the purported tests of these models by Bass and Talarzyk and Sheth and Talarzyk and the original Fishbein and Rosenberg proposed operationalizations were undertaken. Finally, Cohen, Fishbein and Ahtola concluded that the measures used in both studies to operationalize the multiattribute attitude model amounted to the creation of a new model which the authors dubbed the "adequacy-importance" model. Quoting Cohen, Fishbein and Ahtola (1972):

> According to this model, a person's attitude toward a given brand is a function of: (1) the degree to which a brand is considered "satisfactory" with respect to attribute or value i and (2) the importance of i in designing an ideal brand. In effect, then, the two components used might appropriately be labeled "attribute adequacy" and "importance." (p. 459).

Sheth (1972) and Talarzyk (1972) replied to Cohen, Fishbein and Ahtola in defense of their respective studies. Sheth's arguments consisted primarily of citing instances where Rosenberg was less than perfectly clear in his writings, regarding the proper method of operationalizing the Rosenberg model. Talarzyk's reply also attempted to offer the excuse of fuzzy definitions as justification for his treatment of the Fishbein model. In addition, he offered the not very compelling argument that he really hadn't intended to "test" the Fishbein model. If his latter claim is correct, then statements made in the Bass and Talarzyk article are very misleading.

Cohen, Fishbein and Ahtola (1972) also point out that in laboratory studies using valid operationalizations of the Fishbein model the Fishbein model prediction generally correlates about .70 with independent measures of affect.

As of this writing there has been no published research other than the study by Ahtola (1975) which assesses the predictive validity of the Vector Model of Preferences. More will be said about the Ahtola study in the following chapter. However, at this point it may be noted that the Vector model predicted preferences significantly better than the Fishbein model in the Ahtola study.

Mulitattribute Models: Inter-individual Level Analysis

With the exception of the section which immediately precedes this, all of the discussion of multiattribute models up to this point has focused on the intra-individual level of analysis. When the objective was to present the theory behind the different perspectives this level of analysis was most parsimonious. However, the careful reader would have observed in the preceding section that published marketing applications of these multiattribute models have largely been cross-sectional in character. The fact that this level of analysis has been more prevalent than the intra-individual level of analysis in actual practice necessitates review of the conclusions drawn about particular multiattribute models to ascertain if they remain static in this new setting.

A realistic first step involves specification of the type of inter-individual analysis being considered. For the purposes of this discussion, an inter-individual analysis involves N subjects (where $N > 1$) and a single stimulus. A more complex inter-individual analysis, not discussed here, would involve N subjects (where $N > 1$) and K stimuli (where $K > 1$). Since the latter inter-individual analysis is really nothing more than N intra-individual case studies,

any differences which exist between the inter and intra-individual levels of analysis can be uncovered in the single stimulus situation.

At this point the reader should return to Figure 1 which contains the categorization framework for multiattribute models at the intra-individual level. The first criterion used in classification was compensation. This criterion is equally appropriate at this new level of analysis. However, it should be pointed out that the lexicographic model becomes trivial in the single stimulus situation.

The next criterion used in the framework is mathematical form. All of the compensatory models discussed at the intra-individual level of analysis were linear. However, they all become non-linear in the inter-individual single stimulus setting. Why? The reason is that the evaluative aspect of a belief, the utility of an outcome, the value importance of a valued state and the affect associated with a level of an attribute remain constant across stimuli at the intra-individual level of analysis, whereas they become variables at the inter-individual level of analysis. Beliefs, subjective probabilities of outcomes, and perceived instrumentalities were variables at the intra-individual level of analysis and they remain variables at this new level of analysis. The fact that there are two independent variables operating simultaneously makes these models non-linear at the inter-individual level of analysis.

The final criterion employed in the framework dealt with the theoretical perspectives upon which the models were founded. These remain static at this new level of analysis.

CHAPTER III
REVIEW OF FISHBEIN AND VECTOR MODEL PROPERTIES

The theoretical foundation underlying these models was discussed in the previous chapter. Operationally, this class of models postulates that an attitude toward an act is a function of a weighted summation of the values which an individual holds regarding an act, where the "weights" are the belief strengths which he attaches to each of these values.

The advantages offered by the Fishbein and the Vector models to the marketing manager are substantial. Unlike previous conceptualizations of attitude, these models delineate specifically the set of cognitive elements (beliefs and associated attribute evaluations) which are seen as determinants of attitude. Consideration of these attitudinal determinants allows the marketing manager to learn even more about how the consumer views his product and also to determine strategies for changing the consumer's attitude in a favorable direction. The primary advantage of these models over traditional attitude measures lies in their ability to perform the diagnostic and surrogate functions.

Traditional attitude measures like Thurstone and Likert scales provide only a summary evaluation. While these models also combine the information obtained from the respondent into a single affective score (via multiplication and summation) the items constituting the measure are selected only because they provide information as to what

perceptions and evaluations actually underlie the attitude. These models call for the measurement of the "salient" dimensions underlying an individual's attitude; thus a marketer can determine on what "bases" a consumer holds an attitude.

As indicated earlier in the introductory remarks the major strength of the multiattribute attitude models lies in their diagnostic ability. In spite of this fact, the bulk of previous research in this area has dealt with the predictive power of various model forms. With the exceptions of Rosenberg (1965) and Lutz (1975) there has not to this date been a comprehensive examination of a multiattribute attitude model in the attitude change context. This study investigates for the first time two different learning-based models, the Fishbein and the Vector, in the attitude change context holding both up to scrutiny and focuses on the conflicting predictions made by the models.

Rosenberg suggested that "attitudinal affect toward an object may be altered by the prior modification of value importance and perceived instrumentality" (1956, p. 371). In other words, Rosenberg proposed that manipulation of elements within cognitive structure could be expected to produce changes in attitude toward the object. Continuing along the same line, Rosenberg (1965) conducted an experiment to examine in a dynamic context the relationship between the constructs in his model and attitude. Somewhat different than his 1956 focus stated previously, Rosenberg's primary interest in this research seemed to lie in exploration of the "direction" of the relationship between the elements of his model and attitude. Specifically, he wanted to determine if a change induced in a

person's attitude would in turn generate changes in individual cognitive elements (supporting beliefs). This interest apparently stemmed from earlier work in the attitude area conducted by Abelson and Rosenberg (1958). A model was developed in this research which proposed to describe various types of structural relations between cognitive elements. The notion of "balance" (a desire for logical consistency) as an important motivating factor was advocated in this work. Hypotheses were generated regarding the types of possible changes in relations between cognitions which would be required to establish a state of cognitive balance. Since many alternative paths could be followed to attain balance, the authors developed predictions about preferred resolution strategies. It is precisely this motivation to achieve balance that Rosenberg (1965) offered as justification for his predictions of cognitive restructure following attitude change.

Using an innovative methodology, Rosenberg (1965) demonstrated that attitude change can indeed result in the restructure of cognitive elements. The focus of this dissertation, however, is somewhat different. In this research we wish to examine the effect on attitude of a change in a particular element of a person's cognitive structure. The direction of interest, however, is quite similar to the suggestion of Rosenberg (1956) cited earlier. This proposition was never empirically tested by Rosenberg.

Lutz (1975) examined the Fishbein model in terms of attitude change. The three strategies of attitude change he considered operative will be presented later. As of this writing, an examination of the Vector model has not yet been undertaken in the attitude change context; in spite of the fact that in previous research (Ahtola, 1975)

the Vector model has been shown to predict preferences substantially better than the Fishbein model.

The Models

At this point the two competing models of attitude which are the subject of this research will be introduced in detail. They are the Fishbein model and the Vector model.

The Fishbein Model

Fishbein (1963) defined attitude as a mediating evaluative response, the amount of affect for or against a psychological object, group of objects, or behavior. His formulation can be represented by

$$A_o = \sum_{i=1}^{n} B_i \, a_i$$

The multiplicative summation ($\Sigma B_i a_i$) of these elements can be viewed as an index of the cognitive structure underlying A_o, where:

A_o = the attitude toward an object

B_i = the strength of belief (probability) that the object is associated with a particular attribute i or consequence i

a_i = the evaluative aspect of the belief; the evaluation of attribute i

n = the number of attributes to which A_o is believed to be related

Under Fishbein's formulation, A_o should change in response to changes in cognitive structure. These changes could be created through one of three mechanisms:

(1) changing salient beliefs, causing some beliefs to be more

strongly held, and others more weakly held (when corresponding a_i is $\neq 0$);

(2) changing evaluations of particular attributes without changing salient beliefs (when corresponding B_i is $\neq 0$);

(3) introducing new beliefs into cognitive structure; the evaluative aspects of these beliefs will enter into the summation of the previous evaluative responses, thus creating a new overall evaluation (when a_i and B_i are $\neq 0$).

Fishbein measurement scales are patterned after the following examples. The belief measure:

x is i

unlikely ____ : ____ : ____ : ____ : ____ : ____ : ____ likely
-3 0 +3

The affect measure:

i is

bad ____ : ____ : ____ : ____ : ____ : ____ : ____ good
-3 0 +3

The Vector Model (Ahtola, 1975)

$$A_o = \sum_{i=1}^{n} \sum_{j=1}^{g(i)} B_{ij}\, a_{ij}$$

where A_o = a subject's attitude toward an object

B_{ij} = a subject's strength of belief ij about an object (on the dimension i), that is, the probability that it is associated with some other concept ij (i.e., the jth category on dimension i)

a_{ij} = the evaluative aspect of B_{ij}, that is, the individual's evaluation of ij

g(i) = the number of associated categories on dimension i

n = the number of salient dimensions

The Vector model provides for four potential methods of changing A_o. They are:

(1) A change in the shape of the distribution of beliefs may cause attitude change. This entails a change in belief certainty.

(2) A shift in the distribution of beliefs along the attribute dimension.

(3) A change in the affect, a_{ij}, across associated categories on the attribute dimension.

(4) Addition of a new salient dimension.

As previously indicated in the discussion of the Fishbein model, the Vector model is also posited to be an index of the cognitive structure underlying A_o. Illustrations of Vector model measurement scales are forthcoming. Prior to presenting these, a point of clarification should be made:

(a) The affect and belief measures form two vectors across associated categories which can be represented as curves along the associated attribute dimension.

The belief measure for each attribute category:

x is ij

certainly no _ : _ : _ : _ : _ : _ : _ : _ : _ : _ : _ certainly yes
0 1

The affect measure for each attribute category:

ij is

bad ____ : ____ : ____ : ____ : ____ : ____ : ____ good
-3 0 +3

An example may serve to clarify the operationalization of the Vector model. Basically, assume:

(a) A_o refers to attitude toward Coke

(b) there are three salient attributes

(c) each attribute has three levels associated with it

Attribute #1: Sweetness

B	.4	.4	.2
a	2	3	-2
	slightly	fairly	very

Attribute 1's contribution to A_o reduces to:

$$(.4x2) + (.4x3) + (.2x-2) = +1.6$$

For the remaining two attributes the same procedure is followed with A_o ultimately being equal to:

(+1.6) + (Contribution of Attitude 2) + (Contribution of Attribute 3).

Personal communication with Ahtola (1977b) has provided clarification of the current operationalization of the measures employed by Fishbein. Unlike earlier versions, Fishbein now concedes that subjects may respond to an attribute concept which is not only directional but specifies a particular level of the attribute. For example, if a subject's belief statement is, "Coca-Cola is fairly sweet" the associated concept is not "sweet" but "fairly sweet." This revision by Fishbein remedied the problem discussed by Ahtola (1975) in his article introducing the Vector model. One of the original differences in conceptualizing beliefs between the two models was that the Vector model departed from the Fishbein belief interpretation by treating belief content and belief strength as separate entities.

Uncertainty

The Fishbein Model

In the Fishbein conceptualization, the belief, B_i, indicates the perceived likelihood of the association of an object and an attribute. Since likelihood has been interpreted for measurement purposes as a probability-like measure, it then seems reasonable to infer that a mid-scale probability connotes maximum uncertainty.

One particularly serious operational issue involves the isolation of the concept actually used by the subject when responding to the Fishbein belief measure. One possible solution to this problem is presented later.

Although it could be directly obtained, a separate affect measure for the Fishbein model was not taken. Instead, the Fishbein model affect values were inferred from the affect vector of the Vector model when the Fishbein concept was known.

The Vector Model

The amount of uncertainty in beliefs associated with a given attribute is related to the shape characteristics of the distribution of beliefs across such categories as are operative or meaningful for the subject. It is proposed that these belief distributions are instrumental in the prediction of attitude change. The basic types of belief distributions anticipated are illustrated (see Figure 5).

Manifestations of belief change on a given attribute dimension:

(1) Change in the shape of the belief distribution. This could involve a move to more certainty or vice versa.

(2) Shift in the belief distribution without a change in shape characteristics. In this case uncertainty would remain unchanged.

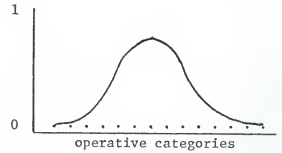
(3) A more complex change in beliefs involving a change in multiple parameters of the belief distribution. As pointed out earlier, this could entail a change in the amount of uncertainty associated with the distribution.

Proposed Method for Isolation of Fishbein Concept

(1) Assume that the attribute of interest is "sweetness" and that the product class of interest is soft drinks.

(2) The subject is exposed to the following type of statement: We would like to get a better understanding of your judgement of the

Low variance (low uncertainty):



High variance (high uncertainty):

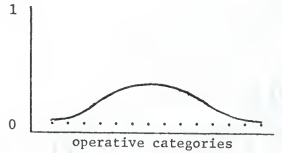


Figure 5

Vector Model Belief Distributions

various attributes of this new soft drink. For example, if you were asked to describe this soft drink to a friend who would base his decision to try the product on your information, precision in your description would be very important.

For each of the attributes of soft drink products we would like you to construct a sentence describing the product using one of the levels of each of the attributes. For example, if PRICE were an attribute the following sentences might be written by different people:

PRICE:	very low	fairly low	moderate	fairly high	very high

"This new soft drink is fairly high priced."

OR "This soft drink tastes better than other moderate priced brands."

OR "I think this drink is not very low priced."

Please write your descriptive sentence below the listing of the levels of each attribute:

SWEETNESS:

very bitter	fairly bitter	slightly bitter	not sweet not bitter	slightly sweet	fairly sweet	very sweet

Your sentence using one level of the attribute:

(Continue for other attributes)

This set of attribute level (concept) choices is determined by pre-testing. It is the same set of attribute levels which is used in the Vector model measurement. Note, care was taken to insure that subjects had the opportunity to associate concepts which might produce low belief strengths [(-) on Fishbein Scales].

(3) Ask subject to rate Brand X on a Fishbein belief scale using the information obtained in #2 as follows:

Brand X is fairly sweet:

("fairly sweet" was the associated concept from #2)

unlikely ____ : ____ : ____ : ____ : ____ : ____ : ____ likely
-3 0 +3

In the Lutz studies of the Fishbein model attitude change properties cited earlier, belief change and affect change strategies were examined. Some of the more important conclusions of that research which bear directly on this effort are:

(1) Subjects appeared to translate brand information into subjective perceptions in a relatively systematic fashion, as indicated by the success of the experimental manipulations of B_i and a_i.

(2) There was an indication that changes in single cognitive elements can affect cognitive structure and attitude in accordance with theory. This relationship was particularly evident for the B_i change process, but not as clear for the a_i change strategy.

(3) Evidence is needed regarding the feasibility of attempting to change a_i elements for attributes with more highly polarized evaluations. The Lutz studies attempted to change a relatively neutral a_i element, although the manipulation was not completely successful. Use of a relatively neutral attribute meant that the amount of potential movement in either direction was less than if a polarized attribute had been attacked, although a more polarized attribute may be more resistant to change.

(4) The potential of the B_i change strategy seems to be very high based on the Lutz findings. He does offer a caution of the following grounds, however:

(a) low commitment level of attitudes

(b) brief time period of the study

(c) use of a hypothetical stimulus brand

The attitude change research contained in this dissertation examines the following mediating consequences:

(1) Fishbein Model

(a) changes in belief strengths

(2) Vector Model

(a) manipulation of belief certainty

At this stage, it should be explicitly stated that this study focuses on beliefs about a particular product attribute and does not attempt to manipulate the affect associated with these beliefs. Instead affect was taken as a "given" and used as a blocking variable in the experiments.

General Hypotheses

Since there are a great number of hypothesized predictions for attitude change which flow from the attitude models under investigation, perhaps the most parsimonious presentation of the hypothesized relations is in a tabular format. Before proceeding, some definitional points should be made:

(1) Basic forms of Vector Model Affect Curves (see Figure 6)

(2) Basic forms of Vector Model Belief Distribution Changes (see Figure 7)

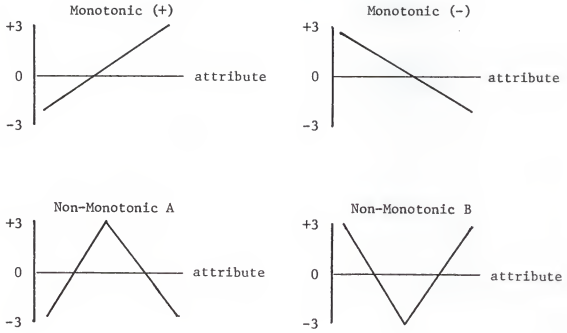
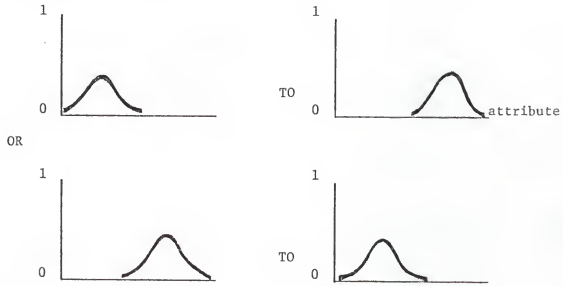


Figure 6

Basic Forms of Vector Model Affect Curves

a. belief shift illustrations—



b. certainty change illustrations--

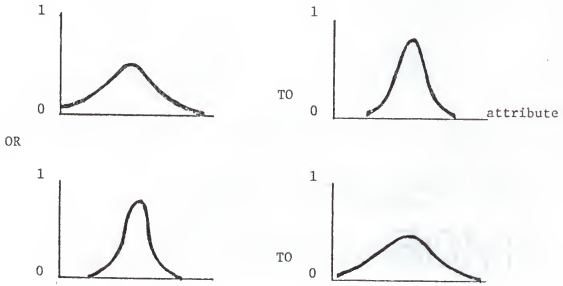


Figure 7

Basic Forms of Vector Model Belief Distribution Changes

The signs in the cells of Table 1 indicate the hypothesized attitude shifts for particular experimental conditions and for a particular model.

Concept Shift

Given the situation outlined in Figure 8, within the Vector model context, attitude may be increased by shifting the distribution of beliefs toward more favorably evaluated concepts provided that the level of certainty is held constant. This would apply to both monotonic and non-monotonic affect curves. It should be noted that this can result in different predictions for non-monotonic B-type affect curves. In this situation there is a choice of concepts which will produce equivalent attitude change (that is, concepts on each side of the affect curve peak).

Following the Fishbein approach, attitude could be increased by:

(1) increasing the B_i associated with the concept "very sweet." This would act to increase the amount of belief certainty.

(2) to increase attitude without affecting certainty would require either:

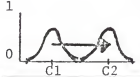
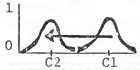
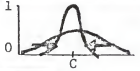
  (a) a change in the affect associated with "very sweet," or

  (b) a change of concept to another possessing a higher level of affect.

Generation of predictions for the Fishbein model (holding the belief strength constant) requires knowledge of the sign of the affect associated with alternative concepts. Since the affect measurement scales for the Vector and Fishbein models utilize the same scale of

Table 1

Hypothesized Attitude Changes

Communication Treatments on Beliefs		Affect Curve Types: (+) Monotonic		Non-Monotonic A		Non-Monotonic B		(-) Monotonic	
	F		+		+		-		-
	V		+		+		-		-
	F		-		-		+		+
	V		-		-		+		+
	F	*	+	*	+	*	+	*	+
	V		0		+		-		0
	F	*	-	*	-	*	-	*	-
	V		0		-		+		0

F - Fishbein, V - Vector, C - Concept

*Predicted Attitude Change if associated affect is (+), otherwise reverse prediction.

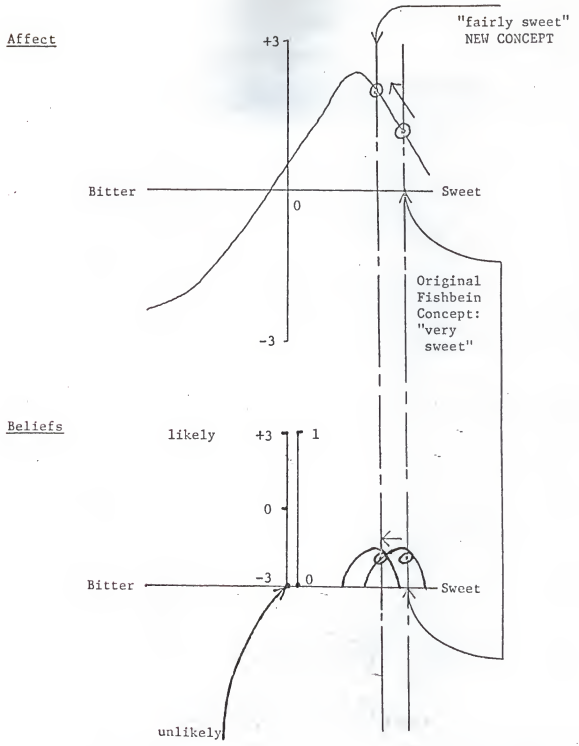


Figure 8

Concept Shift Illustration

measurement, there is substantial face validity to support the use of the Vector model affect curve for prediction with both models.

The previous illustration dealt with the case of attitude change holding the level of certainty constant. A case will now be developed for attitude change prediction holding the concept constant while permitting certainty of beliefs to vary.

Certainty Change

Provided that the affect associated with a concept such as "fairly sweet" in Figure 9 is positive, any increase in beliefs associated with the concept will cause a (+) attitude change Fishbein model prediction. On the other hand, if affect is negative the prediction is reversed. This would hold for either monotonic or non-monotonic affect curves.

For the situation described in Figure 9, the Vector model would predict an increase in attitude due to the reduction in variance or increase in certainty. This prediction would be obtained even if the affects across all associated categories were negative. (Refer to affect type non-monotonic A.)

If in this example the affect curve had been of the type non-monotonic B, predicted attitude change would be (-) for an increase in certainty. This result would be predicted even if the affects across all associated categories were negative.

The final set of Vector model predictions relating to variance change deals with monotonic affect curves. Varying certainty has no effect on monotonic affect curve predictions for attitude change.

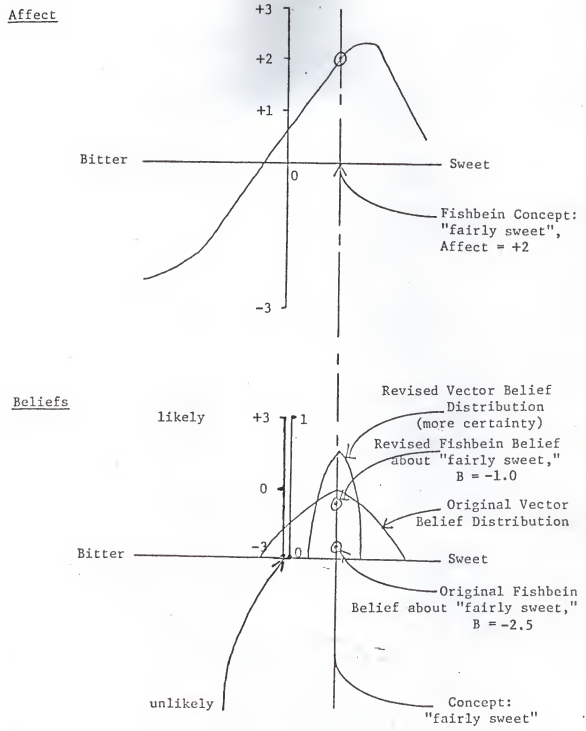


Figure 9

Certainty Change Illustration

That is, no attitude change is predicted provided that an assumption is made that the affect curve is linear.

A Major Operational Constraint

Central to the question of testing the hypotheses for non-monotonic affect conditions is the issue of the kind of beliefs-on-affect mapping which will constitute a valid test and the resulting operational implications for experimental research on this subject. First, this researcher has chosen to define a non-monotonic treatment condition as one in which there is a non-zero Vector model belief strength associated with at least one category on each side of the affect curve maximum or minimum and also at the maximum or minimum category. This means that for a belief distribution to be included it must contain at least three associated categories. In the belief shift conditions for non-monotonic affect four categories are required for each belief distribution, while at least five categories are necessary to permit a shift of the modal concept.

For monotonic affect conditions, as long as the modal concept remains unchanged a change in certainty of beliefs can be accomplished using as few as three categories. For a shift in beliefs, only two categories are necessary in the extreme case.

The following illustration may assist in clarifying the minimum category requirements under different affect and treatment conditions (see Figure 10).

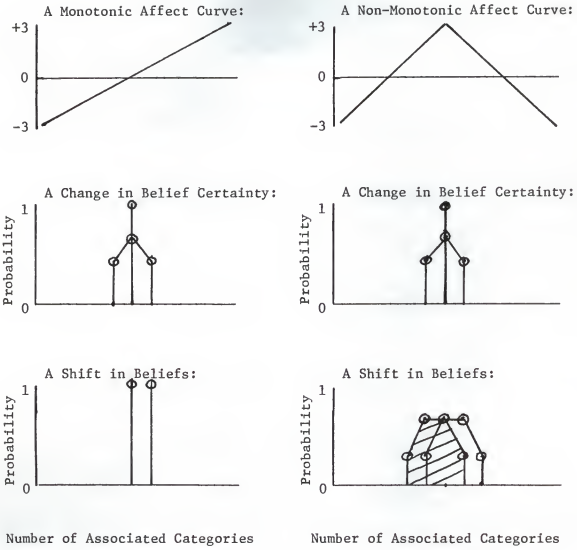


Figure 10

Minimum Category Requirements for Manipulation

CHAPTER IV
THE RESEARCH HYPOTHESES

One of the certainty change conditions has been selected for intensive study in this current research effort. The condition of interest is the one which deals with a reduction in belief certainty. The affect curve types selected for study are types Non-Monotonic A and Non-Monotonic B. Due to the sensitivity of Fishbein model predictions to the sign of the affect associated with beliefs, four separate analyses, each examining a different affect condition, are required to completely explore the effect of changes in cognitive structure on attitudes and preferences for the two basic non-monotonic affect conditions. See Table 2 for specific predictions of the direction of attitude changes.

The first row in Table 2 refers to the type of affect curve (vector) under investigation. All of the affect curves illustrated are non-monotonic. However the fashion in which the affect maps across the attribute dimension differs. The (+) or (-) sign enclosed in the circle indicates the sign of the affect involved: (+) indicates all positive, (-) indicates all negative across the levels of the sweetness attribute involved in the manipulation. The drawings on the left margin of Table 2 indicate if the prediction is being made for the treatment or the control group and serve to illustrate the nature of the belief distribution involved in each group.

Table 2

Research Hypotheses

		EXP 1	EXP 2	EXP 3	EXP 4
		⊕	⊖	⊕	⊖
TREATMENT	F	–	+	–	+
	V	–	–	+	+
CONTROL	F	0	0	0	0
	V	0	0	0	0

F - Fishbein, V - Vector

CHAPTER V
METHOD

The discussion of the methods employed in this research is divided into three sections. They are:

(1) Study Design and Administration

(2) Assignment to Cells and Operationalization of Treatment

(3) Conclusions on Method

By describing the actual operationalization of the experimental setting at the outset the merits of various alternative methodological (design) approaches can be more adequately examined.

Study Design and Administration

The original plan was to test the experimental hypotheses using a pre-test post-test control group design with four blocks with blocks corresponding to particular affect types. The dependent measure of interest in this study is the subject's change in attitude due to the experimental manipulation as measured by the evaluative dimension of a semantic differential scale (Osgood, Suci, and Tannenbaum, 1957).

The experimental task is as follows:

First Wave

(1) All subjects (prior to assignment to an experimental condition) will be asked to respond to scales which are designed to determine their affect curves for each salient attribute dimension of the product class. These salient dimensions and their associated

categories ordinarily would be determined in a pre-test so that the set of attributes provided in the actual study would be the same for all subjects. However, in this case, previous research has been conducted for the product class of interest in this study (Ahtola, 1973). The salient dimensions and their associated categories are available to this researcher and will be used in this study. Thus, a pre-test to obtain these attributes will not be required. (Note: a separate affect measure will not be obtained for the Fishbein model.)

Second Wave

(2) The subjects, both treatment and control group (after assignment to one of the four experiments based on their affect curves) will be exposed to a high credibility print communication scenario which is designed to form beliefs about a specific new product's attributes and features. The reason that a new product entry has been selected for this study is so that an assumption can be made that subjects carry no existing beliefs about the brand of interest into the study. After step #1 each experiment becomes a separate entity.

(3) Subjects, both treatment and control group, will be asked to assign point scores to indicate their beliefs that a specific new brand has certain product attributes after having been exposed to the initial print communication. These scores are the subject's belief measures as obtained from both Fishbein and Vector model scales.

(4) Subjects, both treatment and control group, will be asked to complete a semantic differential scale measuring their attitude toward the product.

(5) Subjects in the treatment condition will be exposed to a communication designed to create uncertainty in their beliefs about

the target attribute. Control group subjects will not receive any communication.

(6) Subjects will be asked to complete the measures of affect and beliefs for all attributes and the semantic differential measure of A_o once again.

A key reason for gathering both pre-test and post-test data on beliefs and affect using both the Fishbein and the Vector models is that such data can serve to validate the communications treatment. It can also be determined if a communication designed to alter one target belief has changed other elements in the cognitive structure. Finally, obtaining the pre-test and post-test affect scores will permit study of the reliability of the instruments.

Assignment to Cells and Operationalization of Treatment

There are a variety of possible methodological (design) approaches to this research. The purpose of this section is to elaborate their respective advantages and disadvantages and arrive at a determination of the preferred course of action.

It may prove useful to group the various approaches into categories (Campbell and Stanley, 1963):

(A) Experiments

(B) Quasi-Experiments

(C) Case Studies

The first three approaches outlined fall into the category of true experimental designs. The fourth approach discussed is a quasi-experimental technique, and the fifth approach is an example of a case technique.

Approach #1, Custom-tailored Treatments

Under this procedure subjects would be exposed to communication treatments which are not outwardly identical but which are geared to produce similar cognitive effects according to the model for each subject in a treatment condition. It should be recognized that this approach will treat a subject's affect for or against levels of a particular attribute as a blocking variable and as such affect would not be under manipulative control.

The best feature of this approach is related to the treatments themselves. That is, this approach does provide the opportunity to guarantee that treatments are actually affecting subjects in the fashion required for the hypotheses tests. This can be established by extensive pre-testing. It is also possible to achieve a fairly high degree of realism in this type of study.

On the negative side it should be apparent that by custom tailoring communications messages for each subject the overall research effort would be greatly increased in time and resource requirements. One mitigating factor might be that groups of subjects exhibit similar belief and affect curves. This could help in reducing the effort necessary in treatment development. Another operational concern lies in the fact that two waves would be required for a complete administration due to the fact that the treatments must be designed based on pre-test results.

Approach #2, Four Completely Randomized Designs with Non-Identical Formation and Treatment Communications

In this design subjects would be assigned to experimental groups based on the way in which their affect curves map across associated

categories on the target attribute. Perhaps this would be a bit clearer conceptually if the attribute dimension is thought of as a series of "levels." Groups of these "levels" form segments which have affect values associated with them. These affect values, as discussed in Chapter III, can be thought of as curves. Since this research is concerned with non-monotonic affect curves, the following is an example of how an affect curve could map across an attribute dimension (see Figure 11).

The particular affect curve illustrated in Figure 11 incorporates two of the four basic non-monotonic affect conditions of interest in this study. The points associated with each are circled in the Figure. From this example it should be easy to see how an affect vector could be arranged to provide the other two non-monotonic affect curve types. It should also be noted that different attribute levels are involved in each of the non-monotonic affect curve cases.

Once these groups have been arrived at subjects are randomly assigned to treatment and control conditions. From this point on subjects are processed through the experiment in the fashion described in the first section which outlined the experimental task.

Although it might be possible to condense this approach into a single sitting, it is highly likely that two waves would be required. This approach should possess very high degrees of internal and external validity within experimental settings ("blocks") but may be prone to interpretation problems across experiments due to the fact that different levels of the target attribute are involved in each study. In fact, it is for this reason that this approach has not been labeled as a Randomized Block Design.

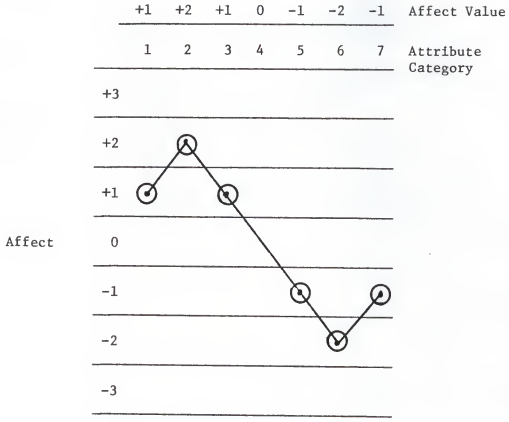


Figure 11

Non-Monotonic Affect Curve Mapping Across an Attribute Dimension

Approach #3

This experimental approach is perhaps the most artificial of all the approaches to be discussed. Basically, the method is as follows:

Instead of permitting subjects to determine their own beliefs in a formation stage, the experimenter provides each subject with a set of beliefs and associated affects about attributes of a hypothetical brand of a hypothetical product and asks the subjects to respond to post-test only measures of their beliefs, affect, and A_{act} based on the premise that they have fully internalized the hypothetical set of beliefs assigned to them by the experimenter.

The key advantages of this procedure are:

(1) Subjects need to complete questionnaires only once.

(2) A single wave study is possible.

(3) All subjects in a given cell possess the same initial beliefs (by definition).

The key disadvantages of this approach are:

(1) Subjects may not fully internalize these beliefs or their associated affects.

(2) There is a very low level of involvement with hypothetical products thus affect should be very low.

(3) Extreme artificiality of experimental setting.

Approach #4, Homogeneous Treatments with Affect Determined After the Fact

This quasi-experimental approach offers the desirable benefit of utilizing homogeneous communication treatments regardless of affect type. Under this approach subjects would be randomly assigned to treatment or control conditions. Another associated benefit of this

method is the opportunity to combine the first and second waves of the study. Operationally, this is a major plus. Also, as far as experimental studies in general are concerned, this approach does have a fair degree of realism.

Under this procedure subjects in a given treatment would be processed through the study in the manner that was outlined in the description of the experimental task. Assignment to affect conditions would be accomplished after the fact by examining the way the subjects pre and post belief vectors map across their affect vectors. In other words, the data themselves would determine the affect condition.

Approach #5

In this case study approach consumers would be studied on an individual basis. The consumer's beliefs about a particular product's attributes would be determined along with their associated affects. Selection of a target attribute for the belief manipulation would be at the discretion of the experimenter. Communication treatments would be devised to create belief changes on the target attribute appropriate to test the hypotheses.

This approach has the potential of being very high on external validity, but due to the process of selection of target attributes for the belief change manipulations the actual treatment may vary not only in its print content but also on the attribute itself and the categories associated with the attribute. This poses a severe threat to internal validity. In addition, as in the quasi-experimental design presented earlier, a single wave administration is possible although the time required could be very lengthy.

A nice feature of this approach is that it is possible to select as a target attribute for the change manipulation one which possesses a fairly high or low level of affect. This increases the opportunity of obtaining statistically significant results.

Conclusions on Method

In the opinion of this investigator the strongest methodological approaches to the test of these hypotheses are the true experimental designs (#1, #2, #3). Approach #3 has been eliminated on the grounds of its high degree of artificiality, which is not necessary to test these hypotheses. Thus, the real choice lies between the first and second approaches. The first approach offers the opportunity to test a novel approach to treatment development, but one which is conceptually sound, while the second approach offers methodological simplicity and clarity. Both are true experimental approaches to a test of the hypotheses. On balance, the advantages of Approach #2 appeared to outweigh those of Approach #1. Approach #2 was adopted in this research.

Selection of Product and Target Attribute

The Product

In order to test the experimental hypotheses it was necessary to find a product which had at least one salient attribute dimension displaying at a given time one of the two types of affect curves under study. As the reader will recall, they are:

(1) non-monotonic A

(2) non-monotonic B

It is proposed that at least one consumer product, soft drinks, may conform to each of the above types of affect curves depending upon the user's particular tastes. The target attribute dimension, "sweetness," for this affect measure will be labeled "bitter-sweet" based on the findings of the "Florida Soft Drink Study" (Ahtola, 1975). This research uses a hypothetical new brand of soft drink as the subject of the communications treatments. Concepts associated with the sweetness dimension for soft drinks according to the Florida Soft Drink Study are: very sweet, fairly sweet, slightly sweet, not sweet/not bitter, slightly bitter, fairly bitter, very bitter.

(A) The set of attributes which were salient for the product class soft drinks (Ahtola, 1973) will become the content dimensions for the initial print communication scenario.

(B) Treatments will be conducted as described earlier.

Since the attitude chosen for study is with respect to a previously nonexistent brand, the experimental manipulations must perform the task of attitude formation as well as attitude change. For this reason, a series of pre-tests were necessary to properly isolate the types of information which would be presented in the attitude formation scenario and in the change-inducing communications treatments. Illustrations of formation and change-inducing messages will be presented later.

It should also be noted that all product attributes, with the exception of the target attribute, were held constant across experimental treatments.

Support for Selection of Target Attribute Dimension

The sweetness dimension described earlier has been extensively examined by Ahtola in two separate studies (1973, 1975). The initial study involved 190 subjects at Western Illinois University. The second study involved 61 subjects at the University of Florida. Mean scores for each level of the sweetness attribute for both studies is contained in Table 3.

Out of the total of 251 combined subjects the modal frequency of each of the affect curve types required for this study follows. Also noted are the categories of the sweetness dimension which were involved.

It should be noted that the frequencies presented indicate fairly strong cases of non-monotonic affect. Each "leg" of the affect curve was required to show at least a one scale unit difference from the affect value at the maximum or minimum. The affect data from these studies were gathered on three scales for added reliability. This makes a single scale unit difference (when based on average scores across the three scales) more compelling.

Experiment #1: (Non-Monotonic A)

(Fairly Sweet - Slightly Sweet - Not Sweet/Not Bitter)

FREQ = 50 Percent of Sample = 20.0

Experiment #2: (Non-Monotonic A)

(Slightly Bitter - Fairly Bitter - Very Bitter)

FREQ = 8 Percent of Sample = 3.2

Table 3

Mean Scores for Each Sweetness Attribute Level in Previous Studies
(Ahtola, 1973 and 1975)

	Very Sweet	Fairly Sweet	Slightly Sweet	Not Sweet Not Bitter	Slightly Bitter	Fairly Bitter	Very Bitter
Illinois	-1.125	1.323	1.677	0.914	0.204	-0.819	-2.267
Florida	2.150	1.170	1.950	1.250	0.100	-1.320	-2.460
Pooled (251)	-0.329	1.286	1.743	0.996	0.179	-0.941	-2.314

Experiment #3: (Non-Monotonic B)

(Slightly Sweet - Not Sweet/Not Bitter - Slightly Bitter)

FREQ = 43 Percent of Sample = 17.2

Experiment #4: (Non-Monotonic B)

(Not Sweet/Not Bitter - Slightly Bitter - Fairly Bitter)

FREQ = 4 Percent of Sample = 1.6

As the reader will recall, the most interesting cases (those involving conflicting predictions for the Fishbein and Vector models) involved experiments #2 and #3. It appeared that we could be reasonably sure, given this preliminary data, that with a sample population of roughly 400 we would be able to satisfy the subject needs of experiment #3 and possibly of experiment #2, also. Based on the Ahtola data, experiment #4, a rather uninteresting case, probably would not have sufficient subjects for a statistical test. The bulk of the subjects would most likely be assigned to experiment #1.

Thus, there was reason to be confident that the sweetness dimension for soft drinks would generate sufficient data to satisfy the research requirements.

Sample Communication Messages

Formation Message: "Sweetness"

It is desired to create a highly certain initial belief centered on the "Not Sweet/Not Bitter" category. The approach taken in the Florida Soft Drink Study which was also applied in this research is as follows:

A recent survey of 100 people taken last month described this new soft drink's sweetness in the following way:

very sweet by 0 people.

fairly sweet by 0 people.

slightly sweet by 10 people.

not sweet/not bitter by 80 people.

slightly bitter by 10 people.

fairly bitter by 0 people.

very bitter by 0 people.

Change Message: "Sweetness"

It is desired to decrease the certainty associated with the above newly formed beliefs. The approach is as follows:

Upon analysis of the demographic data we discovered that the research results we gave earlier came from a study of a sample of individuals which was not particularly representative of the population at large. In fact, more than half of the respondents were past the age of seventy and all were confined to a nursing home for various physical disabilities. However, we do have the results of another survey which was conducted on a group of undergraduates at the University of Florida. They described the same brand of soft drink's sweetness in the following way:

very sweet by 0 students.

fairly sweet by 0 students.

slightly sweet by 31 students.

not sweet/not bitter by 38 students.

slightly bitter by 31 students.

fairly bitter by 0 students.

very bitter by 0 students.

It should be apparent that the same procedure is applicable for any category on the sweetness dimension, but the distributions of category frequencies should be held constant as a control.

Copies of the actual questionnaires used in the study are contained in the Appendix.

CHAPTER VI
DATA COLLECTION, ANALYSIS, AND RESULTS

Instruments were constructed to measure the subjects' responses on the variables required in the hypotheses tests. The basic methodology employed was highlighted in earlier sections of this dissertation. A copy of the questionnaires used in the study is included in the Appendix.

Questionnaire number one which was used to obtain the subjects' initial affect vectors was closely patterned after instruments developed by Ahtola (1973). Extensive pre-testing was not conducted on this particular questionnaire. However, pre-testing was performed on the other two questionnaires used in this research. Effort was taken to insure that instructions were clear to the subjects and that the task requirements were understood. This pre-testing was done individually with approximately twenty people; of whom five were graduate students and the balance were upper division undergraduates.

The procedure employed in the pre-test was to give copies of the questionnaires, in the proper sequence, to the pre-test subjects. Administration was performed on an individual basis with the experimenter sitting at the subject's side to record the subject's reactions and answer any questions. After each set of tasks within the questionnaire was completed, the subject was asked for comments. It was hoped that any format problems would be isolated here. Finally, the

experimenter asked the subject to speculate what the task was attempting to uncover about him. After this, the subject was instructed to proceed with the next task until all questionnaires were completed.

The results of the debriefings of the five graduate students were very enlightening. As a result of these discussions the frequency distributions provided in the formation and change communications were modified to generate maximum realistic impact given the format chosen. Subtle modifications of some instructions directed at increasing clarity of the tasks were also made in response to the comments of these subjects.

The results of the pre-testing performed on the undergraduate students were less useful than those performed on the graduate students. General debriefing comments received could be categorized into the following types:

(A) "I don't know what you are trying to find out in this study."

(B) "It seems like you ask the same things over and over again."

When carefully probed, however, these subjects did provide useful information on the clarity of the instructions given. No one indicated any difficulty in understanding what the instructions were asking, although there are inherent demand characteristics present in this kind of question. A perennial problem, though, involved getting the undergraduate subjects to take their time answering the questionnaires. It would be reasonable to speculate that in this one-on-one format there was some self-induced pressure to complete the instruments in a speedy fashion. Speedy completion might be

perceived by the subjects as a way they could appear "bright" to the experimenter.

No analysis was performed on the data generated during pre-testing. Several reasons for this included:

(A) Affect patterns of the pre-test subjects were not analyzed to see if they conformed to any of the blocking conditions being used in this study.

(B) There was no random assignment to treatment or control groups.

(C) Subjects were interrupted many times during completion of the instruments to answer questions from the experimenter.

(D) Conclusions drawn from an analysis of individual cases can be very misleading.

(E) Not all subjects completed questionnaire one, the pre-measure of affect.

It should be clearly understood, in light of the preceding statements, that no pilot study was ever conducted using these instruments. That is, no formal effort was made to see if the manipulation contained sufficient power to produce the particular change effects which were hypothesized prior to the conduct of the formal study. Obviously, this type of a pilot study would have been highly desirable. However, due to extreme time pressure created by the impending conclusion of Spring Quarter classes at the University of Florida which threatened to disrupt the subject pool, a decision was made to proceed with formal data collection without the pilot study.

A monetary incentive of $2.50 was paid to each subject who participated in the complete study. This figure was arrived at by:

(A) Asking other local researchers what they had recently paid student subjects for similar tasks.

(B) An informal survey of the pre-test subjects as to their opinion on an appropriate subject fee in light of the task.

Originally, the plan was to conduct the experiment in two large group sessions (one session for questionnaire number one and a second session for questionnaires number two and three). Unfortunately, due to a noticeable amount of subject disinterest, six different sessions were required to gather the data contained in questionnaires two and three. Also, in a few cases, it became necessary to give subjects questionnaire packets for completion at home. This was permitted only when the subject refused participation on any other basis.

As the reader will recall from the chapter entitled, Research Hypotheses, four different affect vector types were initially under investigation in this study. As originally conceptualized, there were to be four separate experiments run to investigate the particular hypotheses concerning the effect of a certainty reduction treatment.

Unfortunately, expectations about the nature of affect for various levels of soft drink characteristics held by the subjects included in the first wave of this study were largely disconfirmed. These estimates of the percentage of the population possessing a particular affect vector type were based on results obtained in previous work involving affect for various levels of soft drink characteristics conducted by Ahtola (1973 and 1975). The first wave of this study (questionnaire one) was administered to 248 students enrolled at the University of Florida in a Principles of Marketing course—far less than the approximately 400 students anticipated in

the design phase of the study. This erroneous expectation was based on course enrollment figures which apparently did not accurately reflect class attendance. As the reader will recall, the results of the first questionnaire were to be used as a basis for grouping subjects by affect vector type. Of the 248 subjects who completed questionnaire one, 190 indicated a willingness to continue with the study (complete questionnaires two and three). After analysis of the subjects' initial affect scores according to the criteria outlined in the method section the following soft drink (sweetness) affect vector patterns emerged (see Table 4).

These figures were quite unexpected. However, it was decided to continue with the experiment in spite of them. Modification of the initial research plan involved condensing the study by deletion of experiments number two and number four from further consideration due to an insufficient number of qualifying subjects. Thus, the final total of experimental subjects was 60 (26 subjects corresponding to experiment one and 34 subjects corresponding to experiment three). Cell assignment of the subjects is presented in Table 5.

For analysis purposes, this research design has been interpreted as a Randomized Block Design (see Statistical Appendix) with two blocks (the sweetness affect vector types corresponding to experiments one and three) and two levels of treatment (treatment group and control group). A conscious decision was made to minimize the significance of the fact that <u>two</u> dimensions are actually varying between blocks. That is, the blocks differ more than simply on affect vector type, they also differ on the levels of the sweetness attribute included in the manipulation. In experiment one the levels of the sweetness

Table 4

Subjects' Sweetness Affect Vector Types

Affect Vector Type Suitable for Experiment Number	Expected Number of Subjects	Actual Number of Subjects
One	80	26
Two	13	4
Three	69	34
Four	6	1

Table 5

Cell Assignment of Subjects

	Blocking Variable: Affect Type Corresponding To	
	Exp. 1	Exp. 3
Treatment Group	13 obs.	18 obs.
Control Group	13 obs.	16 obs.
Total	26	34

attribute involved in the manipulation are: fairly sweet, slightly sweet, not sweet/not bitter. In experiment three the levels of the sweetness attribute involved in the manipulation are: slightly sweet, not sweet/not bitter, and slightly bitter. The rationale for this analysis decision was:

(1) There is no evidence to suggest that attribute content would have any meaningful relationship to the treatment administered, and

(2) use of this Analysis of Variance approach permits a more powerful statistical test and the investigation of the possibility of Block X Treatment interaction. The alternative to this analysis would be to conduct two separate T-tests comparing the treatment and control group change score results for each affect vector type separately. This sacrifices degrees of freedom in testing and eliminates the possibility of examining the interaction of block and treatment.

Primary Analyses

The data collected were first examined for the following characteristics:

(1) Success of the Manipulation

(2) Stability of the Blocking Variable (affect)

(3) Hypotheses Tests

The success of the manipulation was examined by means of a Randomized Block ANOVA Design with two blocks and two treatments (see Statistical Appendix). Statistical Analysis was performed using the SPSS (Statistical Package for the Social Sciences) program. Since the

number of observations in each cell of these analyses is unequal, statistical procedures which adjust for non-orthogonality were required. The SPSS package provides three analysis options for handling non-orthogonality. They are: (Nie et al., 1975)

(A) The Classical Experimental Approach

(B) The Hierarchal Approach

(C) The Classic Regression Approach

Given a design with two factors A and B, the classic experimental approach is to partition the total sum of squares (corrected for mean) into the following three types:

$SS_{A,B}$ = sum of squares due to additive effects of A and B

SS_{AB} = sum of squares due to the interaction effect = $SS_{A,B,AB} - SS_{A,B}$

SS_{error} = sum of squares due to error = $SS_y - SS_{A,B,AB}$

Note first the general strategy of partitioning. All three types of components are made orthogonal to one another by imposing a certain hierarchy. The interaction component is defined as the difference between the sums of squares explained by the total joint effect of A and B and the additive effects of A and B. In other words, the interaction component is given by the residual components of the effects of A and B. The error component is likewise defined by the residual sums of squares.

Finally, one partitions the additive effects of A and B into separate main effects. Because A and B are not orthogonal, SS_A and SS_B will not add to $SS_{A,B}$. The classic experimental design approach therefore assigns only the portion of $SS_{A,B}$ that is not accounted for by B to A, and the portion that is not accounted for by A to B. That is,

$SS_{A,B}$

SS_A, adj for B = $SS_{A,B} - SS_B$

SS_B, adj for A = $SS_{A,B} - SS_A$

In general

$SS_{A,B} \neq SS_A$, adj for B + SS_B, adj for A

In summary, the classic experimental approach partitions the sums of squares as shown in Table 6.

Table 6

Analysis of Variance: Classic Experimental Model (Nie et al., 1975)

Source of Variation	Sum of Squares
(1) SS due to A and B, saturated model	$SS_{A,B,AB}$
(2) SS due to A and B, additive model	$SS_{A,B}$
(a) SS due to A, adjusted for B	$(SS_{A,B} - SS_{B})$
(b) SS due to B, adjusted for A	$(SS_{A,B} - SS_{A})$
(3) SS due to A x B interaction	$(SS_{A,B,AB} - SS_{A,B})$
(4) SS residual	$SS_{y} - SS_{A,B,AB}$

In a fixed-effect model, the appropriate F ratio for testing the significance of each component is simply given by

$$F = \frac{\text{SS for that component}/df_1}{SS_{error}/df_2}$$

$$= \frac{\text{MS for that component}}{MS_{error}}$$

with appropriate degrees of freedom. The strategy of significance testing consists of the following.

1. Test the significance of the overall model (usually not performed).
2. Test the significance of interaction.
3. If interaction is not significant, test the significance of the additive model.
4. Test the significance of each main effect.

One important difference of this design from the orthogonal design is that if A and B are strongly associated, it is possible to have a result in which the additive effect as a whole is significant while neither of the individual main effects are significant. This occurs because each factor receives credit only for the incremental SS that it adds to the effects of the other factor. As noted earlier, the individual effects $SS_{A \cdot B}$ and $SS_{B \cdot A}$ do not add up to $SS_{A,B}$. (the notation $SS_{A \cdot B}$ stands for SS_A adjusted for B.)

The second approach, referred to as the hierarchical approach (using stepdown significance testing), is to partition the main effects in a hierarchical manner. For instance, if we assign higher priority to A, then we partition the total additive effects as

$$SS_{A,B} = SS_A + (SS_{A,B} - SS_A)$$

$$= SS_A + SS_{B \cdot A}$$

The procedure for significance testing is the same as in the classic experimental approach. The only difference is that if the additive effect is significant, at least one of the main effects will always be significant.

These two approaches, the classic experimental approach and the hierarchical approach, may be extended to n-way factorial designs. Both approaches partition the SS_y in the same way, except for the handling of the individual main effects. For example, given a three-way factorial design, both approaches initially partition SS_y as indicated in Table 7.

They differ in the partitioning of the additive effects. These are shown in Table 8.

The third approach, referred to as the classic regression approach, partitions individual effects by adjusting for all the other effects. To illustrate, given a two-way factorial

Table 7

Classic and Hierarchical Partitioning of SS_y for a Three-Way Analysis of Variance (Nie et al., 1975)

(1) $SS_{A,B,C}$ (main effects)

(2) $SS_{\text{two-way interaction}} = SS_{A,B,C,AB,AC,BC} - SS_{A,B,C}$

(3) $SS_{\text{three-way interaction}} = SS_{A,B,C,AB,AC,BC,ABC} - SS_{A,B,C,AB,AC,BC}$

(4) $SS_{\text{residual}} = SS_y - SS_{A,B,C,AB,AC,BC,ABC}$

SS_y = total sum of squares = (1) + (2) + (3) + (4)

Table 8

Partitioning of the Additive Effects of a Three-Way Analysis of Variance (Nie et al., 1975)

Source of Variation	Classic Approach	Hierarchial Approach
	$SS_{A,B,C}$ = total additive effects	
A main effect	$SS_{A \cdot BC} = SS_{A,B,C} - SS_{B,C}$	SS_A
B main effect	$SS_{B \cdot AC} = SS_{A,B,C} - SS_{A,C}$	$SS_{B \cdot A} = SS_{A,B} - SS_A$
C main effect	$SS_{C \cdot AB} = SS_{A,B,C} - SS_{A,B}$	$SS_{C \cdot A,B} = SS_{A,B,C} - SS_{A,B}$

> design, it will partition SS_y as in Table 9. The characteristic of this approach is the examination of a given effect only after the effects of all the others (including interaction) are adjusted for.
>
> It should be noted that all three approaches will produce exactly the same result if every cell of the cross classification has exactly the same number of cases, and the first two approaches (experimental and hierarchical) will produce the same result if the main effects are orthogonal, that is, the cell frequencies are proportional to marginal distribution. The choice of the model must be made on the basis of the nature of the problem at hand. (Nie et al., 1975, p. 405-408).

For all of the non-orthogonal Analysis of Variance Computations run in this dissertation, the classic experimental approach was used. The classic experimental approach is the default option in SPSS. The criterion chosen to establish significance in all statistical tests described in this dissertation is $\alpha = .05$.

The results of the ANOVA run on the treatment (certainty reduction on the target attribute, sweetness) showed a significant main effect due to the treatment for the Vector model ($F = 13.994$, $\alpha = .001$, $df = 1/56$). See Figure 12 and Table 10.

The manipulation check was operationalized as follows. As the reader will recall, beliefs as measured by the Vector model can be conceptualized as a probability distribution across different attribute levels. One method of assessing belief certainty is to look at the variance displayed in different belief distributions with zero variance indicating perfect certainty. To evaluate the effect of a certainty reduction treatment, one can simply subtract the pre-measure belief variance from the post-measure belief variance. This variance change can then be attributed to the certainty reduction treatment, ceteris paribus. Computation of sweetness belief variance was

Table 9

Regression Approach Partitioning of SS_y for a Two-Way Analysis of Variance (Nie et al., 1975)

Source of Variation	SS
A and B, additive	$SS_{A,B \cdot AB} = SS_{A,B,AB} - SS_{AB}$
A	$SS_{A \cdot B,AB} = SS_{A,B,AB} - SS_{B,AB}$
B	$SS_{B \cdot A,AB} = SS_{A,B,AB} - SS_{A,AB}$
AB	$SS_{AB \cdot A,B} = SS_{A,B,AB} - SS_{A,B}$

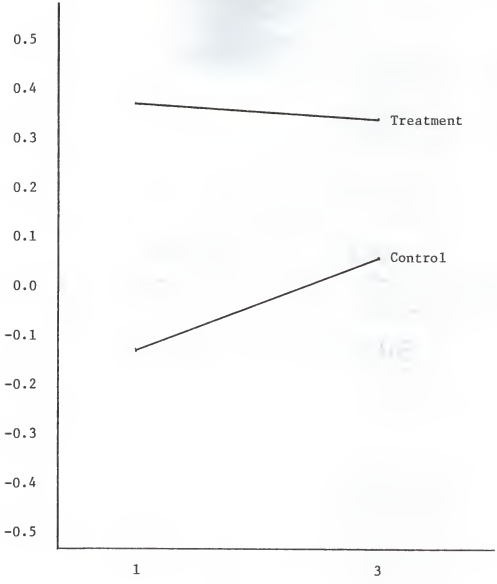


Figure 12

Sweetness Variance Change

Table 10

Analysis of Variance
Sweetness Variance Change

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif. of F
Main Effects	2.083	2	1.042	7.339	0.002
(Affect Vector Type)	0.073	1	0.073	0.514	0.999
(Treatment)	1.986	1	1.986	13.994	0.001
2-Way Interaction	0.154	1	0.154	1.086	0.303
Explained	2.237	3	0.746	5.254	0.003
Residual	7.948	56	0.142		
Total	10.186	59	0.173		

60 cases were processed

performed as shown in Table 11. Table 12 illustrates the actual variance computations.

Table 13 shows the expected and actual variance changes from pre-measure to post-measure on the sweetness attribute. It can be seen that the achieved effects of the manipulation fell somewhat short of the desired level. This weaker than expected manipulation may have contributed, in part, to some of the ambiguous findings about to be presented.

The Fishbein model manipulation check was somewhat complex to operationalize. As a first step, the approach employed involved the selection of only those subjects for analysis who retained the same (whatever was selected first) Fishbein belief concept on the target attribute, "sweetness," from pre-measure to post-measure. This criterion applied to both treatment and control subjects. The rationale behind this requirement was that the treatment manipulation was supposed to affect only belief strength and not belief content. Thus, if changes occurred in the Fishbein sweetness concept from pre-test to post-test these could have been caused by the communication used. To control for this potential problem the data set was cut so that only those subjects whose sweetness concept remained static from pre-test to post-test were analyzed. This subgroup was checked to see if their Fishbein model belief strengths changed in accordance with the predicted effect of the manipulation. The change score was operationalized as: Post-test minus Pre-test on Fishbein belief strength. The expected direction of change was negative for the modal category involved in the manipulation. For this subset of subjects ($n = 40$), a Randomized Block Analysis of Variance with two blocks and two

Table 11

Computation of Vector Model Sweetness Belief Concept
Means and Belief Distribution Variances

Levels of the Sweetness Attribute	Level Code	Belief Strength for a Given Attribute Level*
very sweet	1	b_1
fairly sweet	2	b_2
slightly sweet	3	b_3
not sweet/not bitter	4	b_4
slightly bitter	5	b_5
fairly bitter	6	b_6
very bitter	7	b_7

*b's are integers from zero to ten.

Mean of the sweetness belief distribution (weighted average):
$(1b_1 + 2b_2 + 3b_3 + 4b_4 + 5b_5 + 6b_6 + 7b_7)/10 = \mu$

Variance of the sweetness belief distribution:

$[b_1(\mu-1)^2 + b_2(\mu-2)^2 + b_3(\mu-3)^2 + b_4(\mu-4)^2 + b_5(\mu-5)^2 + b_6(\mu-6)^2 + b_7(\mu-7)^2]/10 = \sigma^2$

Table 12

Computation of Expected Vector Model Sweetness
Belief Certainty Change

	Certainty Condition							Uncertainty Condition						
b_i	0	0	1	8	1	0	0	0	0	3	4	3	0	0
sweetness level	1	2	3	4	5	6	7	1	2	3	4	5	6	7
(b_i x sw lev)	0	0	3	32	5	0	0	0	0	9	16	15	0	0
$\mu = 4$								$\mu = 4$						
$(\mu\text{-sw lev})^2$	9	4	1	0	1	4	9	9	4	1	0	1	4	9
$b_i(\mu\text{-sw lev})^2$	0	0	1	0	1	0	0	0	0	3	0	3	0	0
$\sigma^2 = .2$								$\sigma^2 = .6$						

Certainty Change Expected = .6 - .2 = .4

Table 13

Actual Cell Means of Sweetness Variance Change:

	Affect Type	
	1	3
Treatment*	0.369	0.340
Control	-0.111	0.065

*Main Effect Due to Treatment
$F = 13.994$, $\alpha = 0.001$, $df = 1/56$

Expected Cell Means of Sweetness Variance Change:

	Affect Type	
	1	3
Treatment	0.400	0.400
Control	0.000	0.000

treatments was run on the Fishbein belief change scores (post-test minus pre-test). Non-orthogonality was handled using the Classical Experimental Approach elaborated earlier. The result of the analysis was that the main effect due to treatment was found to be non-significant. See Figure 13 and Table 14. At this point it can be concluded that the manipulation did not affect Fishbein belief certainty to a sufficient degree to permit test of the research hypotheses related to the Fishbein model although the direction of change was as predicted.

The issue of blocking variable stability, from pre-measure to post-measure, was examined by running Pearson Product Moment Correlations (see Statistical Appendix) between the summed values (across three scales) of the Vector model affect scores taken for each level of the study conditions and then again after completion of the manipulation. Correlations obtained were surprisingly low. The range of correlation coefficients (see Table 15) across the seven levels of the sweetness (target) dimension was from .3224 to .6370 (average = .5022). This would suggest the occurrence of either of two problems:

(1) There was a reliability problem in the scales constructed to take the affect measures, or

(2) A real change in affect occurred over time on the target attribute dimension.

In terms of the latter explanation there is considerable evidence that modification of affect for individual elements in cognitive structure can occur particularly during the process of information integration. Two well-known explanations for these kinds of changes

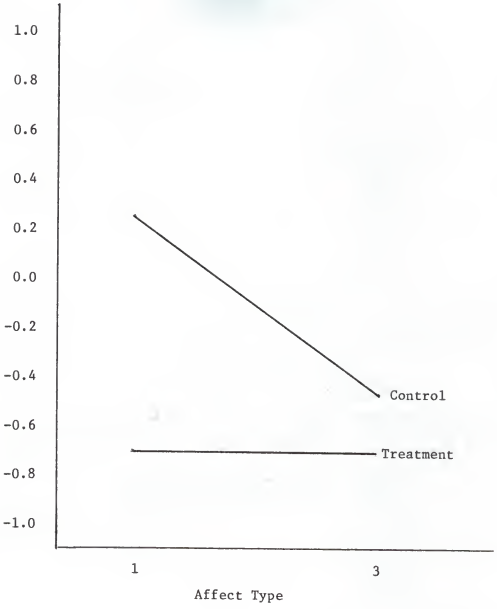


Figure 13

Change in Fishbein Sweetness Concept Belief Strength
Holding Sweetness Concept Constant

Table 14

Analysis of Variance
Fishbein Belief Sweetness Change

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif. of F
Main Effects	3.418	2	1.709	1.812	0.179
(Affect Vector Type)	1.586	1	1.586	1.681	0.203
(Treatment)	2.012	1	2.012	2.133	0.153
2-Way Interaction	1.094	1	1.094	1.160	0.289
Explained	4.512	3	1.504	1.595	0.209
Residual	32.066	34	0.943		
Total	36.579	37	0.989		

38 cases were processed

[Fishbein Sweetness Concept Constant Pre-test to Post-test]

Table 15

Pre-test with Post-test Sweetness Level Affect Score Correlations

Sweetness Attribute Level	Pearson r Value	Significance Level
very sweet	.4717	.001
fairly sweet	.4940	.001
slightly sweet	.3224	.004
not sweet/not bitter	.3583	.002
slightly bitter	.6370	.001
fairly bitter	.6035	.001
very bitter	.6285	.001

Affect values used were the sum of subject's scale values. Only three scales were used to insure pre-test to post-test comparability.

are: changes in meaning and halo effects (Wyer, 1974). As an illustration of a possible change in meaning in this study we have questionnaire 1, the pre-measure of affect. The response frame of reference imposed on subjects was soft drinks in general. In questionnaire 2 a belief formation treatment was administered. It is entirely possible that this new information altered the frame of reference or context that subjects used in questionnaire 3 to record the post-measures of affect. If, in fact, this information about a particular soft drink did refine the subject's frame of reference from soft drinks in general to a particular class of soft drinks one could reasonably expect to see changes occur in reported affect during the course of the study.

Affect instability due to a halo effect could also have occurred in this research. In questionnaire 1 we have the pre-measure of affect with the imposed frame of reference being soft drinks in general. Information is then provided in questionnaire 2 which refines for the subject the particular characteristics of the new soft drink product. At this point the pre-measure of attitude is taken. Whatever this attitude is for a given subject may affect the responses he later gives on the post-measure of attribute affect. If he likes the product, he may increase the affect he assigns to individual attributes as a means of maintaining cognitive consistency and vice versa.

Cronbach's alpha (see Statistical Appendix) statistic was computed to check the internal consistency (reliability) of the items included in the scales. Cronbach's alpha statistic is equivalent to the average of all possible split-half correlation coefficients. The

results of the Cronbach alpha analysis on the scales used to measure a subject's affect for each level of the sweetness attribute are given in Table 16.

Given the extremely high reliability displayed by the scales used to measure the subjects' pre-test affect vectors, it would appear that the former explanation of the pre-test to post-test instability in affect should be rejected.

It should be noted that if the problems with the data collected can be attributed to either of the aforementioned causes, there is justification for concern over any interpretations drawn from this study. These criticisms come from two fronts:

(1) The original affect block assignments may have been improper, or

(2) If the original affect block assignments were indeed accurate, the treatment may have effected changes in affect as well as beliefs.

It is significant to note that the Pearson Product Moment Correlations run on the affect pre-test and post-test measures were equally low when the treatment and control groups were segregated. This would tend to negate the latter explanation. Additional evidence for affect instability comes from direct comparison of the pre-measure and post-measure affect vectors of individual subjects. Applying the same criteria originally used for categorizing subjects into affect blocks to the post-measure sweetness affect vectors gives evidence of major instability in sweetness affect during the course of this study. This can be seen in Table 17.

Table 16

Cronbach's Alpha Statistic Computed for Pre-test Sweetness Level Affect Scales

Affect Scale for Sweetness Attribute Level	Cronbach's Alpha Statistic
very sweet	.9508
fairly sweet	.9578
slightly sweet	.9544
not sweet/not bitter	.9451
slightly bitter	.9806
fairly bitter	.9720
very bitter	.9525

Table 17

Case Analysis of Subjects' Sweetness Affect Vector Stability Throughout Study. Cell Frequencies Indicate Affect Change Patterns for Treatment and Control Group Subjects.

		Pre-Measure Sweetness Affect Qualified Subject for Assignment to Condition			
		IT	IC	3T	3C
Post-measure Sweetness Affect Qualified Subject for Assignment to Condition	IT	6		1	
	1C		7		2
	3T	0		7	
	3C		1		2
	Other	7	5	10	12
	Column Totals	13	13	18	16

Hypotheses tests for the Fishbein and Vector models were conducted by means of a Randomized Block Analysis of Variance with two treatment levels and two blocks. An overall ANOVA for Attitude Change (post-test minus pre-test) was run. Results were not significant (see Figure 14 and Table 18). However, the pattern of results shown by the treatment group tends to lend support to the predictions made by the Vector model and tends to contradict predictions of the Fishbein model. There is no plausible explanation for the control group results which were observed.

Further Analyses

Given the equivocal results cited earlier, considerable effort has been expended in re-analysis of this data set. These secondary analyses focused on the following empirical issues:

I(A). Checks for changes in Vector Model belief variance (certainty) on non-target attributes. Although such changes were not anticipated, if they were to occur for some reason in a study of this sort, it would make it virtually impossible to attribute changes in attitude as being directly linked to changes in belief certainty associated with a single attribute. In this research if such effects were found, they could be used to invalidate the methodology used, leaving unanswered the questions about the validity of the competing models. (Refer to Table 8 for method.)

I(B). Checks for changes in Vector model concept means. This analysis provides information on the cognitive effects of the treatment. That is, did the manipulation induce a

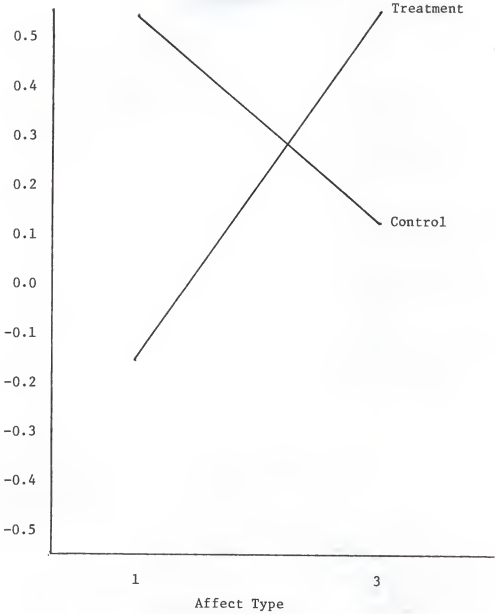


Figure 14

Attitude Change

Table 18

Analysis of Variance
Attitude Change

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif. of F
Main Effects	0.429	2	0.214	0.023	0.999
(Affect Vector Type)	0.388	1	0.388	0.042	0.999
(Treatment)	0.049	1	0.049	0.005	0.999
2-Way Interaction	4.637	1	4.637	0.500	0.999
Explained	5.066	3	1.689	0.182	0.999
Residual	519.112	56	9.270		
Total	524.178	59	8.884		

60 cases were processed

straightforward reduction in sweetness belief certainty (as intended) or was there a concomitant shift in the centrality of the beliefs distribution as it mapped across the levels of the attributes? This was examined:

(1) on the target attribute: sweetness

(2) on other attributes

II(A). Checks for changes in Fishbein model belief certainty on non-target attributes. Although the Fishbein model belief certainty manipulation was not found to be statistically significant, it remains an interesting question to determine if the treatment contributed to changes in belief certainty on non-target attributes. If these unplanned changes did occur, the methodology used in this study to test these specific hypotheses is invalid.

II(B). Checks for changes in Fishbein model concept means. As in (A), above, it is important in reanalysis to establish whether the treatment produced changes in beliefs which were of a character other than that intended by the experimenter. In this research, the manipulation was constructed in such a way as to produce changes in the certainty aspect of subject's beliefs. Efforts were taken to minimize concept shift. If concept shift occurred to a large degree, attribution of the obtained results to certainty change alone would be unfounded. Checks run:

(1) on the target attribute: sweetness

(2) on the non-target attributes

III(A). Check to see if the use of change score measures to generate the attribute change criterion is valid. The use of simple change scores to establish if attitude change has occurred is compelling on two fronts. First, there is a long-standing tradition of using such change scores in attitude research. Second, the interpretability of results is very straightforward. However, this criterion should not be employed without first establishing:

(1) that the measures are at least interval in character, and

(2) that the width of the scale intervals, pre-measure to post-measure, is identical.

If conditions one and two above are not satisfied arithmetic operations will not be meaningful.

IV. Since the belief certainty manipulation failed to produce any statistically significant attitude change and since there is some question as to the purity of the certainty reduction treatment (issues discussed in items I to III), one viable strategy in reanalysis is to determine for each subject how effectively the models predict attitude change against another criterion.

The criterion attitude measure employed was the semantic differential attitude measure (Osgood, Suci, and Tannenbaum, 1957). Only those scales of the semantic differential which loaded on the evaluative dimension were used as the attitude criterion in this study. The criterion attitude value was a summation taken across several of these evaluative scales for added reliability. Analyses were run to:

(a) Check the effectiveness of the Vector model in prediction of attitude change by model fitting.

(b) Check the effectiveness of the Fishbein model in prediction of attitude change by model fitting.

V. Two Randomized Block Analyses of Variance with two treatment levels and two blocking conditions were run on those subjects whose post-measure sweetness affect placed them in the same blocking condition as their pre-measure sweetness affect. The purpose of this analysis is to establish, if possible, what the effect on attitude change of the certainty reduction treatment might have been had subjects' affect vectors remained stable throughout the experiment. The criterion measures in this analysis were:

(a) Sweetness belief certainty change

(b) Attitude change

VI. Analyses were conducted to determine if the information provided to subjects in the attitude formation phase of the experiment interacted with subjects' affect ratings for various levels of the sweetness attribute. Only the control group subjects were included in these analyses. The reason being that treatment group subjects were exposed to the belief certainty manipulation which could have a differential effect on affect (although both models hold that belief and affect are orthogonal).

As the reader will recall, three categories of the sweetness attribute were used in determining subjects' affect block assignments. Two methods were used to determine if change

occurred in the affect associated with these categories from pre-test to post-test, they were:

(a) Average affect change (post-test minus pre-test) averaged across the three pertinent sweetness attribute levels.

(b) Average affect change (post-test minus pre-test) for the modal (belief) sweetness attribute level.

Results of the analyses related to the foregoing questions follow.

I(A). Results of Randomized Block Analysis of Variance with two treatment levels and two blocking conditions run on Vector model belief certainty for non-target attributes were as follows:

FLAVOR - (See Figure 15 and Table 19.) There was no belief certainty change.

CARBONATION - (See Figure 16 and Table 20.) There was no belief certainty change.

CALORIES - (See Figure 17 and Table 21.) There was no belief certainty change.

The above results were in accord with expectations about the effect of the experimental treatment.

I(B). Results of a Randomized Block Analysis of Variance with two treatment levels and two blocking conditions run on Vector model concept mean changes for all attributes were as follows:

FLAVOR - (See Figure 18 and Table 22.) There was no concept mean change.

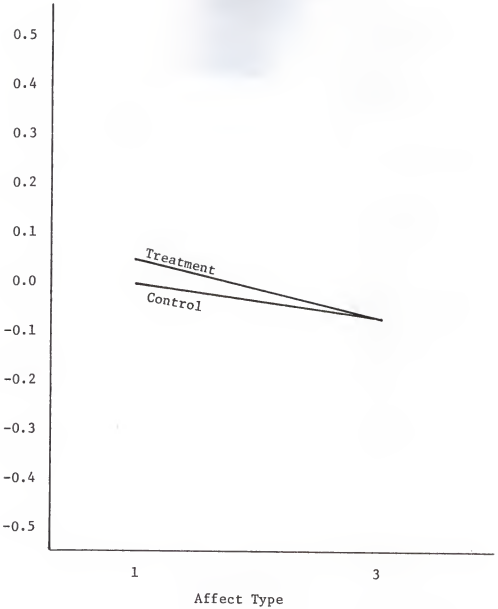


Figure 15

Flavor Variance Change

Table 19

Analysis of Variance
Flavor Variance Change

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif. of F
Main Effects	0.110	2	0.055	0.749	0.477
(Affect Vector Type)	0.108	1	0.108	1.464	0.231
(Treatment)	0.004	1	0.004	0.049	0.826
2-Way Interaction	0.004	1	0.004	0.048	0.827
Explained	0.114	3	0.038	0.515	0.673
Residual	4.126	56	0.074		
Total	4.240	59	0.072		

60 cases were processed

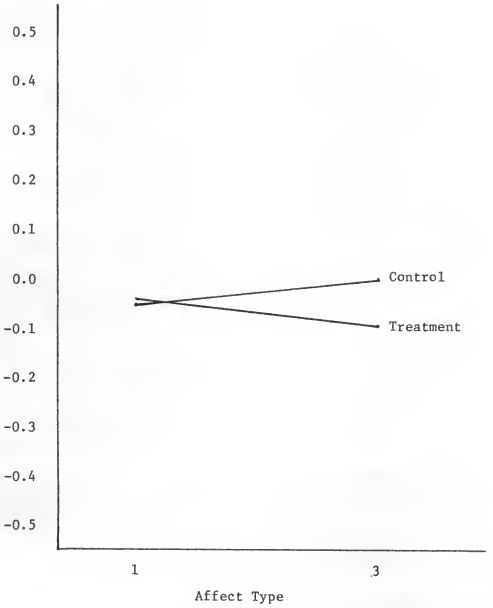


Figure 16

Carbonation Variance Change

Table 20

Analysis of Variance
Carbonation Variance Change

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif. of F
Main Effects	0.041	2	0.021	0.493	0.614
(Affect Vector Type)	0.000	1	0.000	0.000	0.988
(Treatment)	0.041	1	0.041	0.984	0.326
2-Way Interaction	0.037	1	0.037	0.893	0.349
Explained	0.079	3	0.026	0.626	0.601
Residual	2.345	56	0.042		
Total	2.424	59	0.041		

60 cases were processed

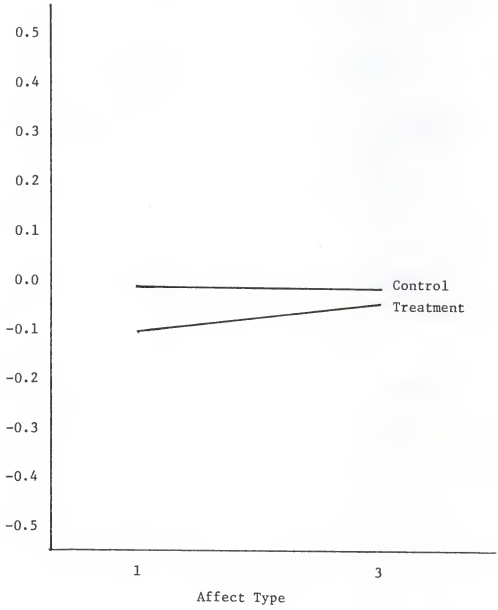


Figure 17

Calorie Variance Change

Table 21

Analysis of Variance
Calorie Variance Change

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif. of F
Main Effects	0.041	2	0.020	0.518	0.599
(Affect Vector Type)	0.012	1	0.012	0.305	0.583
(Treatment)	0.030	1	0.030	0.758	0.388
2-Way Interaction	0.021	1	0.021	0.539	0.466
Explained	0.062	3	0.021	0.525	0.667
Residual	2.200	56	0.039		
Total	2.262	59	0.038		

60 cases were processed

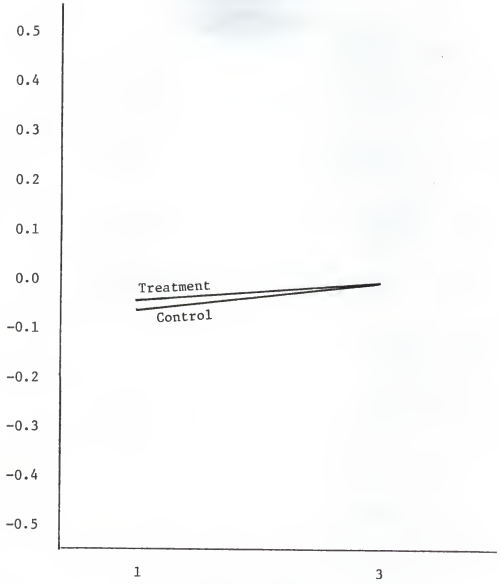


Figure 18

Flavor Mean Change

Table 22

Analysis of Variance
Flavor Mean Change

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif. of F
Main Effects	0.030	2	0.015	0.191	0.827
(Affect Vector Type)	0.028	1	0.028	0.356	0.553
(Treatment)	0.002	1	0.002	0.020	0.887
2-Way Interaction	0.002	1	0.002	0.023	0.879
Explained	0.032	3	0.011	0.135	0.939
Residual	4.440	56	0.079		
Total	4.472	59	0.076		

60 cases were processed

CARBONATION - (See Figure 19 and Table 23.) There was no concept mean change.

SWEETNESS - (See Figure 20 and Table 24.) There was no concept mean change.

CALORIES - (See Figure 21 and Table 25.) There was no concept mean change.

The above results were in accordance with expectations about the effect of the experimental treatment.

II(A). Results of a Randomized Block Analysis of Variance with two treatment levels and two blocking conditions run on Fishbein model beliefs held on non-target attributes follow shortly. The data set was cut so that only those subjects whose Fishbein belief concepts remained constant on all soft drink attributes were included in the analysis.

FLAVOR - (See Figure 22 and Table 26.) There was no belief certainty change.

CARBONATION - (See Figure 23 and Table 27.) There was no belief certainty change.

CALORIES (See Figure 24 and Table 28.) There was no belief certainty change.

The above results were in accordance with expectations about the effect of the experimental treatment.

II(B). Results of a Randomized Block Analysis of Variance with two treatment levels and two blocking conditions run on the Fishbein model to check for shifts in Fishbein belief concepts were as follows:

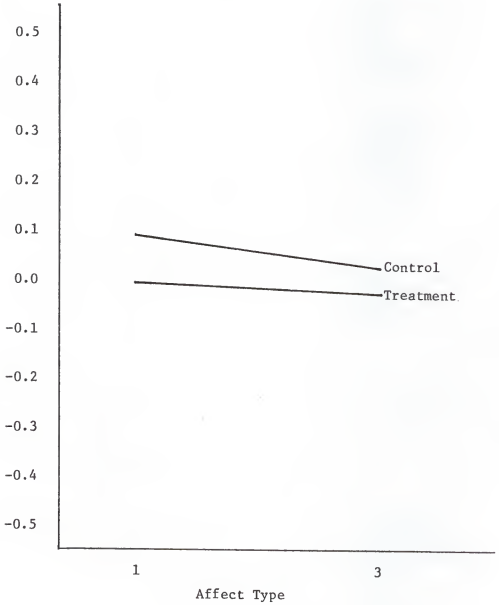


Figure 19

Carbonation Mean Change

Table 23

Analysis of Variance
Carbonation Mean Change

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif. of F
Main Effects	0.109	2	0.054	0.756	0.474
(Affect Vector Type)	0.026	1	0.026	0.364	0.549
(Treatment)	0.080	1	0.080	1.109	0.297
2-Way Interaction	0.004	1	0.004	0.059	0.809
Explained	0.113	3	0.038	0.523	0.668
Residual	4.036	56	0.072		
Total	4.149	59	0.070		

60 cases were processed

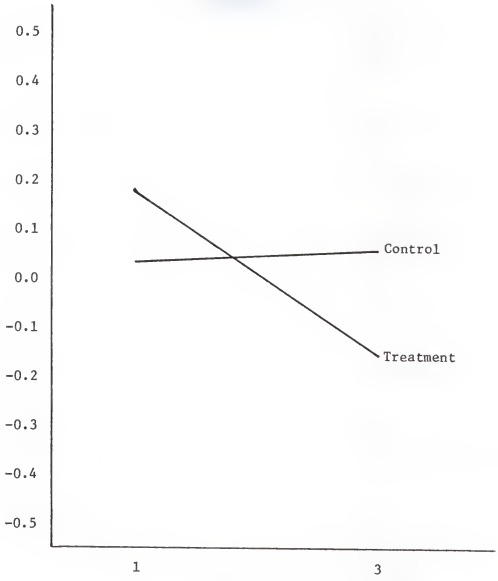


Figure 20

Sweetness Mean Change

Table 24

Analysis of Variance
Sweetness Mean Change

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif. of F
Main Effects	0.364	2	0.182	0.783	0.462
(Affect Vector Type)	0.334	1	0.334	1.436	0.236
(Treatment)	0.025	1	0.025	0.105	0.747
2-Way Interaction	0.434	1	0.434	1.865	0.177
Explained	0.798	3	0.266	1.144	0.340
Residual	13.024	56	0.233		
Total	13.822	59	0.234		

60 cases were processed

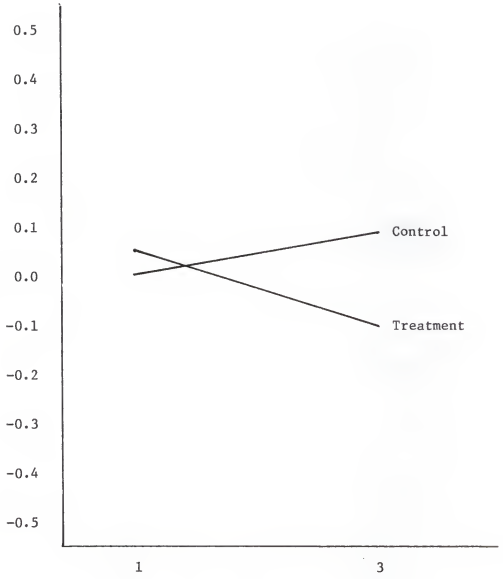


Figure 21

Calorie Mean Change

Table 25

Analysis of Variance
Calorie Mean Change

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif. of F
Main Effects	0.138	2	0.069	1.133	0.329
(Affect Vector Type)	0.024	1	0.024	0.388	0.536
(Treatment)	0.111	1	0.111	1.826	0.182
2-Way Interaction	0.201	1	0.201	3.308	0.074
Explained	0.338	3	0.113	1.858	0.147
Residual	3.399	56	0.061		
Total	3.737	59	0.063		

60 cases were processed

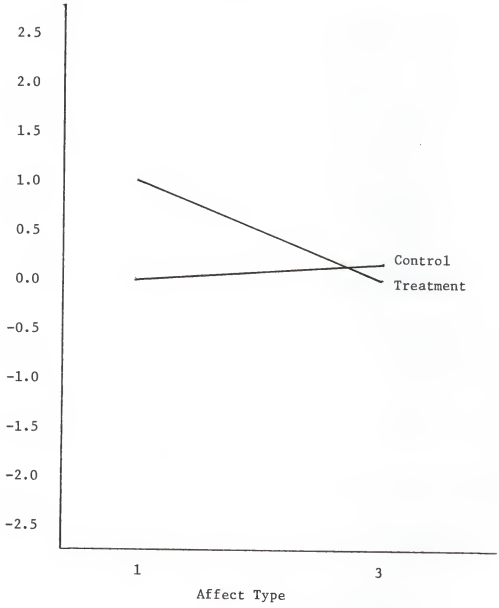


Figure 22

Change in Fishbein Flavor Concept Belief Strength
Holding all Fishbein Concepts Constant

Table 26

Analysis of Variance
Change in Fishbein Flavor Concept Belief Strength

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif. of F
Main Effects	0.115	2	0.057	0.100	0.905
(Affect Vector Type)	0.097	1	0.097	0.169	0.685
(Treatment)	0.033	1	0.033	0.058	0.812
2-Way Interaction	0.802	1	0.802	1.397	0.252
Explained	0.917	3	0.306	0.532	0.666
Residual	10.909	19	0.574		
Total	11.826	22	0.538		

23 cases were processed

[All Fishbein concepts held constant]

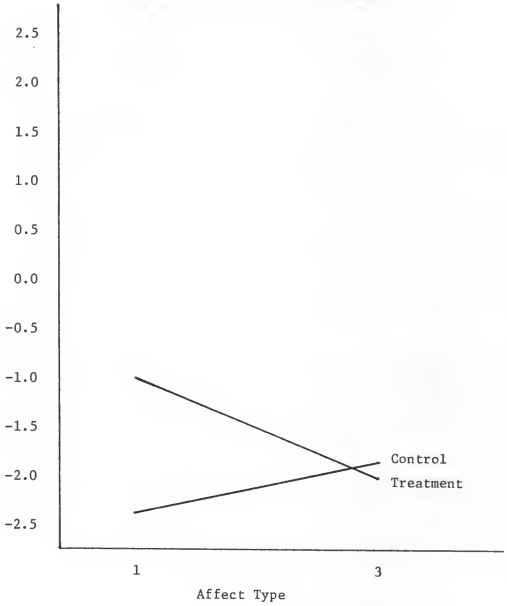


Figure 23

Change in Fishbein Carbonation Concept Belief Strength
Holding all Fishbein Concepts Constant

Table 27

Analysis of Variance
Change in Fishbein Carbonation Concept Belief Strength

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif. of F
Main Effects	0.315	2	0.158	0.229	0.798
(Affect Vector Type)	0.239	1	0.239	0.347	0.563
(Treatment)	0.037	1	0.037	0.054	0.819
2-Way Interaction	1.579	1	1.579	2.294	0.146
Explained	1.895	3	0.632	0.917	0.451
Residual	13.084	19	0.689		
Total	14.978	22	0.681		

23 cases were processed

[All Fishbein concepts held constant]

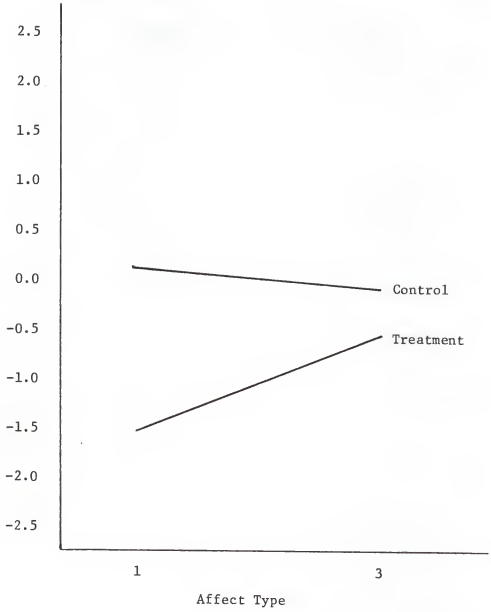


Figure 24

Change in Fishbein Calorie Concept Belief Strength
Holding all Fishbein Concepts Constant

Table 28

Analysis of Variance
Change in Fishbein Calorie Concept Belief Strength

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif. of F
Main Effects	1.803	2	0.901	1.895	0.178
(Affect Vector Type)	0.002	1	0.002	0.004	0.949
(Treatment)	1.733	1	1.733	3.644	0.072
2-Way Interaction	1.029	1	1.029	2.162	0.158
Explained	2.831	3	0.944	1.984	0.151
Residual	9.038	19	0.476		
Total	11.870	22	0.540		

23 cases were processed

[All Fishbein concepts held constant]

FLAVOR - (See Figure 25 and Table 29.) There was no concept shift.

CARBONATION - (See Figure 26 and Table 30.) There was a significant interaction effect ($F = 5.344$, $\alpha = .024$, $df = 1/56$). There is no straightforward explanation for this.

SWEETNESS - (See Figure 27 and Table 31.) There was no concept shift.

CALORIES - (See Figure 28 and Table 32.) There was no concept shift.

The results obtained in this section were quite surprising. Although the calorie, flavor and sweetness concepts did not shift from pre-measure to post-measure there was an interaction effect recorded for the carbonation attribute. However, this may not have been related to the administration of the treatment as evidenced by the fact that a major shift occurred on the sweetness attribute in the control group. These results are very puzzling. Subjects were free to shift their Fishbein concept during the study, but there should have been no differential effect of shifting across affect type or treatment group.

III(A). A simple linear regression analysis (see Statistical Appendix) was conducted to determine if the scale intervals on the pre-measure and post-measure attitude (criterion) scales possessed sufficient equivalence to permit meaningful conclusions to be drawn from difference scores computed using

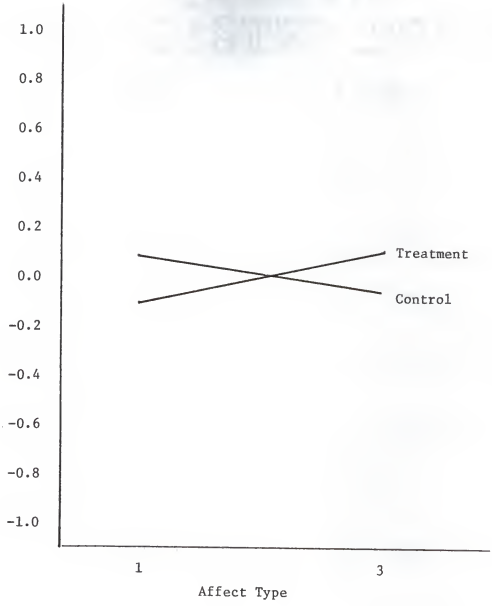


Figure 25

Shift in Fishbein Flavor Concept

Table 29

Analysis of Variance
Shift in Fishbein Flavor Concept

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif. of F
Main Effects	0.028	2	0.014	0.010	0.990
(Affect Vector Type)	0.012	1	0.012	0.009	0.925
(Treatment)	0.015	1	0.015	0.011	0.916
2-Way Interaction	0.394	1	0.394	0.296	0.588
Explained	0.422	3	0.141	0.106	0.956
Residual	74.561	56	1.331		
Total	74.983	59	1.271		

60 cases were processed

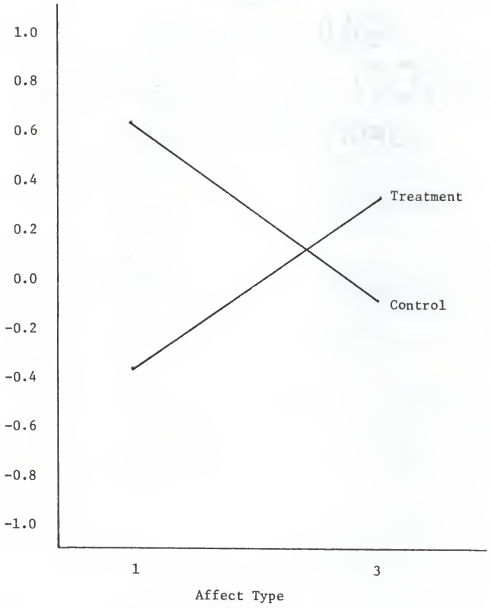


Figure 26

Shift in Fishbein Carbonation Concept

Table 30

Analysis of Variance
Shift in Fishbein Carbonation Concept

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif. of F
Main Effects	0.676	2	0.338	0.252	0.778
(Affect Vector Type)	0.021	1	0.021	0.016	0.901
(Treatment)	0.662	1	0.662	0.493	0.485
2-Way Interaction	7.166	1	7.166	5.344	0.024
Explained	7.842	3	2.614	1.949	0.132
Residual	75.091	56	1.341		
Total	82.933	59	1.406		

60 cases were processed

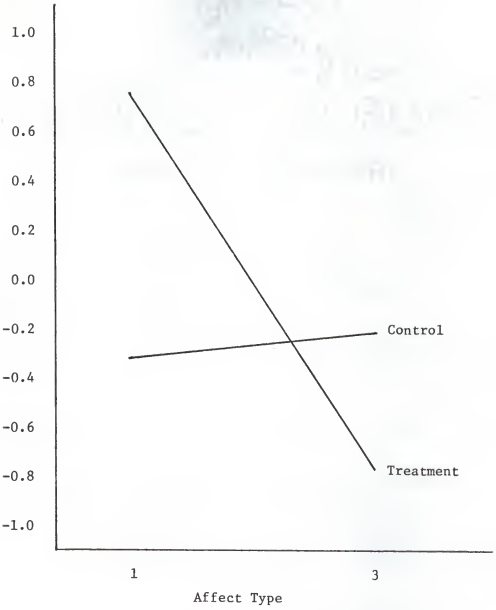


Figure 27

Shift in Fishbein Sweetness Concept

Table 31

Analysis of Variance
Shift in Fishbein Sweetness Concept

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif. of F
Main Effects	8.135	2	4.068	1.454	0.242
(Affect Vector Type)	7.946	1	7.946	2.841	0.097
(Treatment)	0.267	1	0.267	0.096	0.758
2-Way Interaction	10.223	1	10.223	3.655	0.061
Explained	18.358	3	6.119	2.188	0.100
Residual	156.625	56	2.797		
Total	174.983	59	2.966		

60 cases were processed

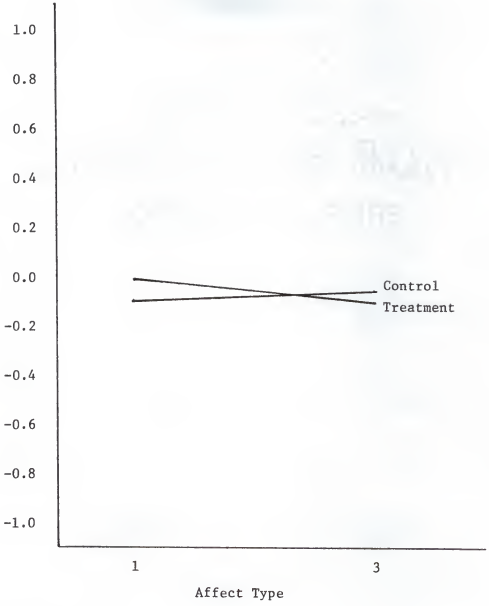


Figure 28

Shift in Fishbein Calorie Concept

Table 32

Analysis of Variance
Shift in Fishbein Calorie Concept

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif. of F
Main Effects	0.037	2	0.019	0.015	0.985
(Affect Vector Type)	0.037	1	0.037	0.030	0.864
(Treatment)	0.001	1	0.001	0.000	0.984
2-Way Interaction	0.058	1	0.058	0.047	0.830
Explained	0.095	3	0.032	0.025	0.994
Residual	69.638	56	1.244		
Total	69.733	59	1.182		

60 cases were processed

a subject's pre-measure and post-measure attitude. As the reader will recall the criterion measure was constructed using the scales of the semantic differential (Osgood, Suci and Tannenbaum, 1957) having high loadings on the evaluative factor. The results can be seen in Table 33.

On the basis of these beta values there would appear to be ample support for the use of change scores as the criterion variable in the hypotheses tests for attitude change. Perfect scale interval equivalence would be indicated by a beta equal to one. The obtained betas are very nearly equal to one.

IV(A). In order to check the effectiveness of the Vector model in the prediction of attitude change, the pre-test and post-test data obtained were fitted to the Vector model. In one analysis, the pre-test attitude measure was correlated with the pre-test Vector model prediction, the result was a correlation coefficient of 0.1514 (n = 65) which was not significant. In addition, the post-test attitude measure was correlated with the Vector model post-test prediction of attitude. The result was a correlation coefficient of 0.4584 (n = 65) which was significant at the .001 level. These results are substantially lower than those usually obtained (Ahtola, 1975). Finally, to test the Vector model's attitude change predictions a correlation was run between the change in Vector model predictions of attitude and the direct attitude change measure. The result was a correlation coefficient of -.1293 (n = 65) which was not significant. All in all, the results of the Vector model fitting task were very poor.

Table 33

Results of Linear Regression Analysis Run on Subjects' Pre-test and Post-test Attitude Scores (The Criterion Measure)

Treatment Group

Beta = .88689

Std. Error B = .07452

F = 117.930

R-Square = .78657

Control Group

Beta = .94191

Std. Error B = .06726

F = 228.086

R-Square = .88720

In fact, the model's prediction of attitude change was in the wrong direction. Given that in the hypothesis test there was no significant attitude change effect recorded, it could be inferred that the improvement in correlations (post-measure minus pre-measure) between the Vector model and attitude resulted from a learning effect. That is, familiarity with the rather involved Vector model measurement task.

IV(B). The procedure used to test the effectiveness of the Fishbein model in the prediction of attitude change was as follows. The pre-test and post-test data were fitted to the Fishbein model which generated numerical predictions of each subject's attitude. In the first analysis the pre-test attitude measure was correlated with the pre-test Fishbein model prediction. The result was a correlation of .3570 ($n = 65$) which was significant at the .002 level. In another analysis, the correlation between the post-test attitude and the post-test Fishbein model prediction was .4050 ($n = 65$) which was significant at the .001 level. The correlation between the Fishbein model prediction of attitude change and actual attitude change was .0644 ($n = 65$) which was not significant. It is important to note that as in the case of the Vector model analysis discussed in IV(A), the correlations improved the second time the measures were taken—perhaps support for a learning effect. Overall, though, the Fishbein model did a wholly unsatisfactory job of predicting attitude change in this study.

V(A). Results of the Randomized Block Analysis of Variance with two treatment levels and two blocking conditions run on sweetness belief certainty change were disappointing. For this particular group of subjects the manipulation was not statistically significant. (See Figure 29 and Table 34.)

V(B). Results of the Randomized Block Analysis of Variance with two treatment levels and two blocking conditions run on attitude change were also disappointing. For this particular group of subjects the certainty reduction treatment did not produce a statistically significant amount of attitude change. (See Figure 30 and Table 35.) However, the direction of attitude change was once again consistent with Vector model predictions.

VI(A). Results of this analysis indicated an average decline in affect across the three critical sweetness categories of 0.36 scale units. Out of 29 cases, 17 dropped, 5 increased, and 7 remained unchanged. Due to the small change in affect displayed there is little evidence to support the contention that formation message content induced systematic change in attribute affect.

VI(B). Results of this analysis indicated an average decline in modal category affect of 0.22 scale units. Out of 29 cases, 5 dropped, 11 increased, and 13 remained unchanged. As in VI(A), there is little evidence to support the contention that formation message content induced systematic change in attribute affect.

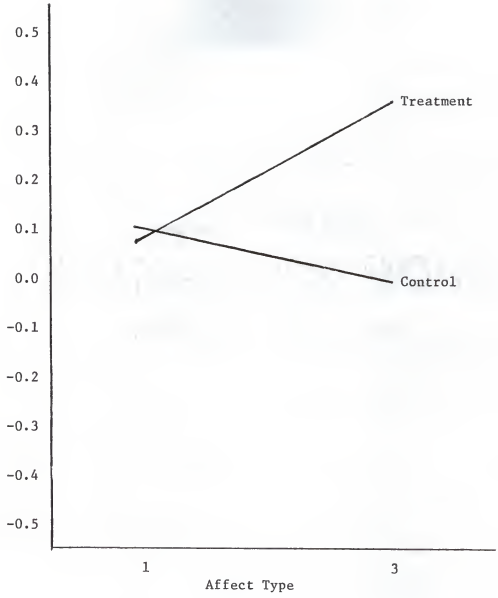


Figure 29

Sweetness Belief Variance Change

Table 34

Analysis of Variance
Sweetness Belief Variance Change

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif. of F
Main Effects	0.456	2	0.228	1.796	0.194
(Affect Vector Type)	0.189	1	0.189	1.487	0.238
(Treatment)	0.125	1	0.125	0.982	0.335
2-Way Interaction	0.102	1	0.102	0.801	0.383
Explained	0.558	3	0.186	1.464	0.258
Residual	2.285	18	0.127		
Total	2.843	21	0.135		

[Subjects whose affect blocking type remained constant throughout the study]

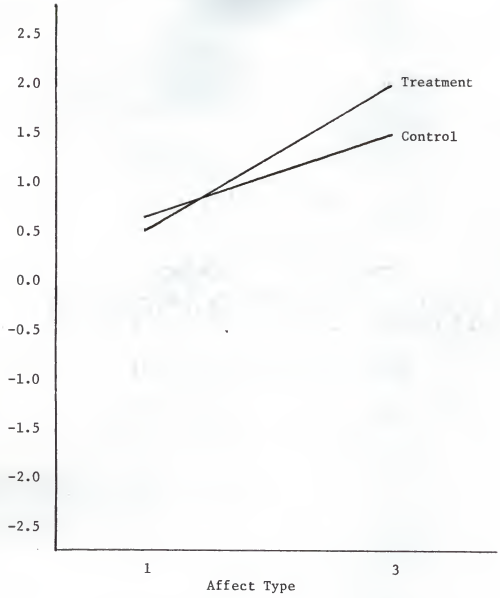


Figure 30

Attitude Change

Table 35

Analysis of Variance
Attitude Change

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif. of F
Main Effects	9.761	2	4.881	0.550	0.586
(Affect Vector Type)	8.268	1	8.268	0.932	0.347
(Treatment)	0.063	1	0.063	0.007	0.934
2-Way Interaction	0.343	1	0.343	0.039	0.846
Explained	10.104	3	3.368	0.380	0.769
Residual	159.714	18	8.873		
Total	169.818	21	8.087		

[Subjects whose affect blocking type remained constant throughout the study]

CHAPTER VII
CONCLUSIONS

The preceding chapter discussed in considerable detail various methodological problems which appear to have contributed to the results obtained in this study. It is the traditional purpose of summary remarks such as these to highlight any implications of the preceding research, isolate problem areas, and establish criteria for future research into unresolved issues. This shall follow.

Major Problem Areas In This Research

(1) Analysis of the data indicated that the planned certainty change manipulation was weak. In a replication of this study it would be highly desirable to conduct a full-fledged pilot study to insure that the manipulation produces a sufficient magnitude of target belief certainty change to induce a statistically significant amount of attitude change.

(2) The Vector model belief measure was subject to error. Evidence for this comes from the fact that model fitting results were much weaker than customarily obtained in applications of the model. In subsequent studies consideration should be given to revision or change in the methodology used to elicit Vector beliefs. The poker chip method used by Ahtola has worked successfully in the past. Perhaps the method used in this research (which was chosen to

permit group administration) should be abandoned in favor of an interviewer/laboratory format using the original poker chip technique.

(3) Instability of pre-test to post-test affect vector measures was discovered. It is impossible to conclusively establish the cause of this problem through post hoc data analysis. However, many previous studies have been undertaken (with apparent success) using the same kind of affect-sensitive semantic differential type scales employed in this study. Two possible explanations for the results uncovered in this study may be:

(a) Low Incentive

(b) High Task Complexity

As the reader will recall, subjects were paid $2.50 for their participation in this research. Perhaps due to the fact that the student subjects were aware that this was student sponsored research, no dissatisfaction was voiced with the level of payment offered. In fact, a sizeable number of subjects indicated willingness to forego payment altogether. On the surface this would seem to indicate an absence of problems with incentive level. However, it has not been established that this $2.50 payment produced a high level of involvement with the experimental task.

Furthermore, the demands placed on subjects, although restricted to the bare essentials, were substantial. To recapitulate, subjects were required to attend two experimental sittings and complete three fairly intricate questionnaires. As evidence for the latter concern, one subject commented to the experimenter after completing his materials that: "I'll bet a number of people 'Christmas-treed' those scales to finish up in a hurry." Further discussion clarified the

meaning of the expression "Christmas-tree." As it turns out, it is student jargon used to describe the process of checking off scales on questionnaires without reading either the instructions or the questions carefully.

Based on comments from several departing subjects, it is apparent that many subjects felt a personal obligation to help out a fellow student by completing the instruments. However, it is a distinct possibility that this obliging attitude did not generate the desired degree of attention to instructions and detail.

Positive Results

Despite the acknowledged difficulties with this study, there appear to have been some "successes." These include:

(1) Introduction of a new method to record Vector model beliefs for group questionnaire administration. Although there were real problems encountered with the technique in the formal study administration, this method was very successful when used with the highly motivated (laboratory style administration) subjects involved in questionnaire pre-testing.

(2) Introduction of a new method for isolation of Fishbein model belief concepts. This appeared to be successful, although the only criterion available is face validity. For example, substantial concept switching did occur among the subject population as measured by this method. Thus, the method did not seem to force subjects to retain the same concept from pre-test to post-test.

(3) Sweetness belief formation and change procedures were partially successful. That is, there was a statistically significant

difference, pre-test to post-test, in Vector model sweetness belief variance. However, as discussed in the previous chapter, the magnitude of the difference was modest.

Conclusions and Suggestions for Future Research

In general, it is unfortunate that none of the important issues which motivated this research have been resolved in this study. We remain uncertain as to which attitude model, the Fishbein or the Vector, predicts the direction of attitude change correctly in cases where there is a reduction in belief certainty. However, there is some evidence (not at a statistically significant level) which tends to support the Vector model predictions. In order for these questions to be answered conclusively a replication of this study is necessary. Suggestions for changes and improvements were made in the last two chapters which should strengthen the methodology and permit more satisfying results to be obtained.

As for the question of validation of the two models, not all of the critical issues could have been resolved by the successful conclusion of this study. Other unresolved questions which require investigation are:

(a) An examination of the effect of a certainty reduction treatment on monotonic affect curves.

(b) An examination of the effect of a certainty increasing treatment on monotonic affect curves.

(c) An examination of the effect of a certainty increasing treatment on non-monotonic affect curves.

The research questions posed above round out an exhaustive list of the situations in which the Vector model and the Fishbein model offer conflicting predictions for attitude change.

APPENDICES

APPENDIX A

STATISTICAL APPENDIX

APPENDIX A
STATISTICAL APPENDIX

This appendix is intended to provide supplementary information about statistical techniques employed in the dissertation. Coverage is not intended to be exhaustive but is limited to those aspects of the various concepts and techniques germaine to their application in this research.

Arithmetic Mean

The arithmetic mean of a set of measurements is a summary statistic used to classify or describe a group of observations on a variable. It is one of a set of measures of central tendency which include: the arithmetic mean, the median, and the mode. The arithmetic mean of a set of n measures is equal to the sum of the measurements divided by n. The formula for the arithmetic mean:

$$\bar{y} = \frac{\sum_{i=1}^{n} y}{n}$$

Variance

The degree to which numerical data tend to spread about an average value is called the variation or dispersion of the data. Various measures of dispersion are available, such as: variance, standard deviation, and range.

The variance of a set of n sample measurements, y_1, y_2, . . ., y_n, is defined as the sum of the squared deviations of the measurements about their mean, $\bar{y}$, divided by n. The sample variance is denoted as s^2, where:

$$s^2 = \sum_{i=1}^{n} \frac{(y_i - \bar{y})^2}{n}$$

Analysis of Variance
(Randomized Block Design)

A randomized block experimental design minimizes any individual differences between groups which could act to obscure treatment effects. This type of design is appropriate for experiments that meet the following conditions (Kirk, 1968):

(1) One treatment with more than one treatment level.

(2) Assignment of subjects to blocks should be conducted so that the variability among subjects within any block is less than the variability between the blocks. That is, homogeneity is desired within blocks and heterogeneity between blocks.

(3) There must be random assignment of subjects to each of the treatment levels of the block. An exception to this randomization procedure is made when a block consists of one subject who receives all levels of the treatment and when the nature of the treatment precludes randomization of order.

(4) The number of subjects and observations within each block must be equal.

Various Methods Used to Achieve Within Block Homogeneity (Kirk, 1968)

(1) Use identical twins (medical research).

(2) Match subjects on relevant characteristics.

(3) Use the subject as his own control.

If variation within blocks is significantly smaller than variation between blocks, this technique is more powerful than a completely randomized design. This is its greatest strength. However, if in actuality the variation between blocks is less than or equal to the variation within blocks the design's power is considerably reduced.

Assumptions of the Model for Randomized Block Designs (Kirk, 1968)

(1) The observations in the KN cells constitute random samples of size 1 from each KN population (K is the number of treatment levels and N is the number of blocking conditions).

(2) All KN populations are normally distributed with variance of σ^2 constant for each cell.

(3) Block and treatment effects are additive.

Advantages of Randomized Block Design (Kirk, 1968)

(1) Greater power relative to the completely randomized design for many research applications. This design permits the experimenter to minimize the effects of individual differences.

(2) Flexibility. Any number of treatment levels and blocks can be used in an experiment.

(3) Simplicity in data analysis.

Disadvantages of Randomized Block Design (Kirk, 1968)

(1) If a large number of treatment levels are included in the experiment, it becomes difficult to form blocks having minimum within-block variability.

(2) In the fixed effects model, a test of treatment effects is negatively biased if $\beta\pi > 0$.

Operationalization of the Randomized Block Design In This Research

Actual analysis was conducted using the Statistical Package for the Social Sciences (SPSS) computer program. The SPSS analysis technically was conducted as if the data conformed to a completely Randomized Factorial Design. Factorial designs provide a simultaneous evaluation of two or more treatments in one experiment. In this analysis, however, one of the "treatments" was actually the blocking condition.

The assumptions of the Completely Randomized Factorial Design are:

(1) Two or more treatments with each treatment having two or more levels. If there are p levels of one treatment and q levels of another treatment, the experiment consists of pq treatment combinations.

(2) Random assignment of subjects to the pq treatment combinations, with each subject receiving only one combination.

The reader will note that in the Randomized Block Design "blocks" differ from "treatments" in that the latter are under manipulative control and the former are not.

The fixed-effects linear model for the Completely Randomized Factorial Design (CRF) is (Kirk, 1968):

$$X_{ijm} = \mu + \alpha_i + \beta_j + \alpha\beta_{ij} + \varepsilon_{m(ij)},$$

where μ = grand mean of treatment populations.

α_i = effect of treatment i, which is constant for all subjects within treatment population i, $\sum_{i=1}^{p} \alpha_i = 0$.

β_j = effect of treatment j, which is a constant for all subjects within treatment population j, $\sum_{j=1}^{q} \beta_j = 0$.

$\alpha\beta_{ij}$ = effect that represents non-additivity of effects α_i and β_j, $\sum_{i=1}^{p} \alpha\beta_{ij} = 0$, $\sum_{j=1}^{q} \alpha\beta_{ij} = 0$.

$\varepsilon_{m(ij)}$ = experimental error, which is normally and independently distributed, with mean = 0 and variance = σ_ε^2.

The fixed-effects linear model for the Randomized Block Design (RBD) with one observation per cell is (Kirk, 1968):

$$X_{ij} = \mu + \beta_j + \pi_i + \varepsilon_{ij},$$

where μ = grand mean of treatment populations, which is constant for all observations.

β_j = effect of treatment j, which is constant for all observations within treatment population j, $\sum_{j=1}^{k} \beta_j = 0$.

π_i = a constant associated with block i, $\sum_{i=1}^{n} \pi_i = 0$.

ε_{ij} = experimental error, which is independent of other ε's and is normally distributed within each treatment population with mean = 0 and variance = σ_ε^2.

The reader will note the similarity of these two models. The correspondence is as follows:

RBD	CRF
X_{ij}	X_{ijm}
μ	μ
β_j	β_j
π_i	α_i
ε_{ij}	$\alpha\beta_{ij} + \varepsilon_{m(ij)}$

The important difference between the two models, other than the conceptual difference between "blocks" and "treatments" is in the formulation of the error term. The error term (ε_{ij}) for the Randomized Block Design incorporates the sum of squares which would correspond to a Block X Treatment interaction if one were expected. Since a Block X Treatment interaction is unexpected in the Randomized Block Design (reflected by the lack of an interaction term in the model), the residual sum of squares for a test of effects is computed as:

Residual S.S. = Total S.S. - Treatment S.S. - Block S.S.

Thus, to properly test for main effects (according to the Randomized Block Model) using a statistical analysis derived for a Completely Randomized Design, the researcher must pool the sum of squares for the Block X Treatment interaction with the sum of squares for the CRF residual to arrive at a proper estimate of the sum of squares for the RBD residual. This pooled sum of squares is then used as the error term in the significance tests.

Procedures for handling non-orthogonality in factorial designs were discussed extensively in the analysis chapter.

Regression Analysis
(Simple Linear Regression)

Linear regression involves a predictive equation whose simple linear form is:

$$y = \beta_0 + \beta_1 x + \epsilon_i$$

where y = the dependent variable

β_0 = the intercept (estimated statistically)

β_1 = the slope, the response of y to a unit change in x (estimated statistically)

x = the independent variable

ϵ_i = the error of prediction

Assumptions of the Linear Model

(1) ϵ_i is a random variable with mean zero and variance σ^2 (unknown).

(2) Level of measurement of both y and x is at least interval.

(3) ϵ_i and ϵ_{i+1} are uncorrelated.

Applications

(1) Linear regression has been widely used as a forecasting technique.

(2) Linear regression can be useful in explaining the relationship between a set of independent variables and a dependent variable.

Strengths

Linear regression offers researchers a method to determine the strength of the linear relationship between two variables based on the "coefficient of correlation."

Coefficient of Correlation Formula

$$r = \frac{\sum_{i=1}^{n} (x_i - \bar{x})(y_i - \bar{y})}{\sum_{i=1}^{n} (x_i - \bar{x})^2 \sum_{i=1}^{n} (y_i - \bar{y})^2}$$

Interpretation of r value

(1) $r = 0$ implies no linear relationship.

(2) $|r| = 1$ implies a perfect linear relationship.

(3) The sign (+ or -) denotes the direction of the relationship.

Meaning of r^2

(1) r^2 is generally assumed to be a more meaningful interpretation than r of the strength of the linear relation between y and x.

(2) r^2 is equal to the ratio of the reduction in the sum of squares of deviations obtained by using the linear model to the total sum of squares of deviations about the sample mean $\bar{y}$, which would be the predictor of y if x were ignored.

The primary goal of linear regression analysis is to obtain predictions of one variable using known values of another.

Weaknesses of Simple Linear Regression

(1) A model with only one independent variable will frequently leave a great deal more variance unexplained than models containing multiple independent (predictor) variables.

(2) x and y could be perfectly related by a curvilinear function and the r or r^2 of the linear relationship would indicate no correlation.

Coefficient Alpha

Research which involves measurement should also address the question of the reliability of the measures employed. When a test or inventory of items is used to measure a concept two types of instrument reliability are an issue. These are (Cronbach, 1951):

(1) Stability

(2) Equivalence

Stability refers to the instrument's ability to reproduce the same result over time. Equivalence refers to the degree to which items contained in the test measure are the same content dimension.

Analysis of the internal structure of tests (equivalence) typically involves the computation of correlation coefficients. Alternate forms (subsets) of the test are correlated to give an indication of interitem consistency. Popular measures of equivalence are:

(1) The Split-Half

(2) Cronbach's Alpha

The split-half involves dividing the items in a test in half and computing a correlation coefficient between the separate forms. One of the operational problems associated with the use of split-halves is that the correlations obtained are necessarily related to the criteria used to subdivide the test. Several methods have been developed in an attempt to reduce the arbitrary nature of the split decision. Perhaps the most objective is the random split.

In recent years, Cronbach's Alpha has achieved widespread usage. Some of the properties of the Alpha coefficient are (Cronbach, 1951):

(1) Alpha is the mean of all possible split-half coefficients.

(2) Alpha is the expected value when two random samples of items from a pool like those given in the test are correlated.

(3) Alpha is a lower bound for the coefficient of equivalence obtained by simultaneous administration of two tests having matched items.

(4) Alpha estimates, and is a lower bound to the proportion of test variance attributable to common factors among the items.

A test which has all items tapping the same content factor is maximally interpretable, particularly if there is no measurement error. The expected value of Alpha in this ideal case is one. The formula for computation of Cronbach's Alpha statistic is:

$$\alpha = \frac{n}{n-1}\left[1 - \frac{\sum_{i=1}^{n} V_i}{V_t}\right]$$

where V_t = variance of test scores

V_i = variance of item scores after weighting (provision is made for tests in which items are of unequal weight)

n = number of items in the test

APPENDIX B

QUESTIONNAIRES

Questionnaire #1

Subject No. _____
(1: 1-3)

Your Name _____

Your Social Security Number _____

Your Student Classification _____

Your Local Address _____

_____

Your Telephone Number _____

Dear Student,

Your cooperation in filling out this questionnaire is greatly appreciated. When the data from these initial questionnaires is analyzed a sizeable number of your classmates which satisfy certain research criteria will be invited to participate in the second and third parts of this study. The names of these people will be posted outside this classroom and outside room 28 in Bryan Hall.

Those INVITED STUDENTS WHO AGREE TO PARTICIPATE in the remaining two parts of the study (which will require no more than ONE HOUR TOTAL to complete) will be paid the sum of TWO DOLLARS AND FIFTY CENTS UPON SUCCESSFUL, CAREFUL COMPLETION OF ALL SECTIONS OF THE SECOND AND THIRD QUESTIONNAIRES. These students will be allowed to take the questionnaires home with them to fill out at their leisure. Arrangements will be made to distribute and pick up the second and third questionnaires in a manner which should be convenient for all participants. SPECIFIC DETAILS WILL BE ANNOUNCED IN CLASS.

The purpose of this research is to learn about consumer preferences for soft drinks. Your individual responses will be held in strict confidence. Please follow directions as closely as possible. Work quickly, but carefully. Remember, there are no right or wrong answers. Please work by yourself since discussing the questions with others will invalidate the results.

Thanks again.

Sincerely,

G. L. Sullivan

Gary L. Sullivan,
Experimenter

In this study we are interested in your feelings and judgements about soft drinks. Any information that you give in this study will be held strictly confidential.

Principal Investigator: Gary L. Sullivan

I, the undersigned, do understand the purpose of this study. The study has been defined and explained to me by the investigator whose name is signed below and I agree to participate in this study. I understand that I may withdraw my consent at any time without suffering negative consequences.

Subject's Signature _____ Date _____ Witness _____

G. L. Sullivan

Investigator's Signature

1-3

We are interested in your judgements of certain characteristics of soft drinks. When we evaluate such characteristics, we do so on the basis of what they represent or mean to us.

Here is how you are to use the following scales in judging product characteristics involved in this study:

If you feel that the product characteristic above the scales is very closely related to one end of the scale, you should place your check-mark as follows:

unpleasant _X_:___:___:___:___:___:___ pleasant

OR

unpleasant ___:___:___:___:___:___:_X_ pleasant

If you feel that the product characteristic is quite closely related to one or the other end of the scale (but not extremely), you should place your check-mark as follows:

good ___:_X_:___:___:___:___:___ bad

OR

good ___:___:___:___:___:_X_:___ bad

If the product characteristic seems only slightly related to one side as opposed to the other side (but is not really neutral), then you should check as follows:

satisfying ___:___:_X_:___:___:___:___ dissatisfying

OR

satisfying ___:___:___:___:_X_:___:___ dissatisfying

The direction toward which you check, of course, depends upon which of the two ends of the scale seem more characteristic of your feeling toward the characteristic you're judging.

If you consider the product characteristic to be neutral on the scale, both sides of the scale equally associated with the characteristic, or if you feel completely indifferent toward the characteristic, then you should place your check-mark in the middle space.

good ___:___:___:_X_:___:___:___ bad

IMPORTANT: (1) Place your check-marks in the middle of spaces not on the boundaries.

THIS NOT THIS

___:___:_X_:___:__X__:___

(2) Be sure you check every scale for every product characteristic - do not omit any.

(3) Never put more than one check-mark on a single scale.

Do not worry or puzzle over individual items. It is your first impression, the immediate "feelings" about the items, that we want. On the other hand, please do not be careless, because we want your true impressions.

In this study we are interested in soft drinks as refreshments, and not, for example, in mixed drinks.

Many of us can notice different amounts of sweetness, carbonation and calories as well as different kinds of citrus flavors used in soft drinks.

Citrus flavors in soft drinks have been divided into the following categories:

lemon flavor	grapefruit flavor	lemon-lime flavor	no particular citrus flavor

Carbonation in soft drinks has been divided into the following categories:

very carbonated	fairly carbonated	slightly carbonated	not at all carbonated

Sweetness in soft drinks has been divided into the following categories:

very sweet	fairly sweet	slightly sweet	not sweet not bitter	slightly bitter	fairly bitter	very bitter

Calorie content in soft drinks has been divided into the following categories:

many calories	some calories	few calories	no calories

Please study the above categories carefully. Every time a certain category, say "fairly sweet," appears in this study, it should have exactly the same meaning to you. There are no right or wrong answers; we are interested in what you would call "fairly sweet" or "few calories" or "lemon flavor," etc.

Try not to change the meaning of a category (e.g., "fairly sweet") as you go along and let your own opinions of what "fairly sweet" means be your guide.

1-5

lemon flavor	grapefruit flavor	lemon-lime flavor	no particular citrus flavor

I personally feel that what I would call "LEMON FLAVOR" is

good ___:___:___:___:___:___:___: bad		(4)
unpleasant ___:___:___:___:___:___:___ pleasant		(5)
satisfying ___:___:___:___:___:___:___ dissatisfying		(6)
worthless ___:___:___:___:___:___:___ valuable		(7)
favorable ___:___:___:___:___:___:___ unfavorable		(8)
annoying ___:___:___:___:___:___:___ pleasing		(9)

lemon flavor	grapefruit flavor	lemon-lime flavor	no particular citrus flavor

I personally feel that what I would call "GRAPEFRUIT FLAVOR" is

good ___:___:___:___:___:___:___ bad		(10)
unpleasant ___:___:___:___:___:___:___ pleasant		(11)
satisfying ___:___:___:___:___:___:___ dissatisfying		(12)
worthless ___:___:___:___:___:___:___ valuable		(13)
favorable ___:___:___:___:___:___:___ unfavorable		(14)
annoying ___:___:___:___:___:___:___ pleasing		(15)

lemon flavor	grapefruit flavor	lemon-lime flavor	no particular citrus flavor

I personally feel that what I would call "LEMON-LIME FLAVOR" is

good ___:___:___:___:___:___:___ bad		(16)
unpleasant ___:___:___:___:___:___:___ pleasant		(17)
satisfying ___:___:___:___:___:___:___ dissatisfying		(18)
worthless ___:___:___:___:___:___:___ valuable		(19)
favorable ___:___:___:___:___:___:___ unfavorable		(20)
annoying ___:___:___:___:___:___:___ pleasing		(21)

1-6

lemon flavor	grapefruit flavor	lemon-lime flavor	no particular citrus flavor

I personally feel that what I would call "NO PARTICULAR CITRUS FLAVOR" is

good ___:___:___:___:___:___:___	bad	(22)
unpleasant ___:___:___:___:___:___:___	pleasant	(23)
satisfying ___:___:___:___:___:___:___	dissatisfying	(24)
worthless ___:___:___:___:___:___:___	valuable	(25)
favorable ___:___:___:___:___:___:___	unfavorable	(26)
annoying ___:___:___:___:___:___:___	pleasing	(27)

very carbonated	fairly carbonated	slightly carbonated	not at all carbonated

I personally feel that what I would call "VERY CARBONATED" is

good ___:___:___:___:___:___:___	bad	(28)
unpleasant ___:___:___:___:___:___:___	pleasant	(29)
satisfying ___:___:___:___:___:___:___	dissatisfying	(30)
worthless ___:___:___:___:___:___:___	valuable	(31)
favorable ___:___:___:___:___:___:___	unfavorable	(32)
annoying ___:___:___:___:___:___:___	pleasing	(33)

very carbonated	fairly carbonated	slightly carbonated	not at all carbonated

I personally feel that what I would call "FAIRLY CARBONATED" is

good ___:___:___:___:___:___:___	bad	(34)
unpleasant ___:___:___:___:___:___:___	pleasant	(35)
satisfying ___:___:___:___:___:___:___	dissatisfying	(36)
worthless ___:___:___:___:___:___:___	valuable	(37)
favorable ___:___:___:___:___:___:___	unfavorable	(38)
annoying ___:___:___:___:___:___:___	pleasing	(39)

1-7

very carbonated	fairly carbonated	slightly carbonated	not at all carbonated

I personally feel that what I would call "SLIGHTLY CARBONATED" is

good ___:___:___:___:___:___:___ bad	(40)
unpleasant ___:___:___:___:___:___:___ pleasant	(41)
satisfying ___:___:___:___:___:___:___ dissatisfying	(42)
worthless ___:___:___:___:___:___:___ valuable	(43)
favorable ___:___:___:___:___:___:___ unfavorable	(44)
annoying ___:___:___:___:___:___:___ pleasing	(45)

very carbonated	fairly carbonated	slightly carbonated	not at all carbonated

I personally feel that what I would call "NOT AT ALL CARBONATED" is

good ___:___:___:___:___:___:___ bad	(46)
unpleasant ___:___:___:___:___:___:___ pleasant	(47)
satisfying ___:___:___:___:___:___:___ dissatisfying	(48)
worthless ___:___:___:___:___:___:___ valuable	(49)
favorable ___:___:___:___:___:___:___ unfavorable	(50)
annoying ___:___:___:___:___:___:___ pleasing	(51)

very sweet	fairly sweet	slightly sweet	not sweet not bitter	slightly bitter	fairly bitter	very bitter

I personally feel that what I would call "VERY SWEET" is

good ___:___:___:___:___:___:___ bad	(52)
unpleasant ___:___:___:___:___:___:___ pleasant	(53)
satisfying ___:___:___:___:___:___:___ dissatisfying	(54)
worthless ___:___:___:___:___:___:___ valuable	(55)
favorable ___:___:___:___:___:___:___ unfavorable	(56)
annoying ___:___:___:___:___:___:___ pleasing	(57)

1-3

very sweet	fairly sweet	slightly sweet	not sweet not bitter	slightly bitter	fairly bitter	very bitter

●

I personally feel that what I would call "FAIRLY SWEET" is

good ___:___:___:___:___:___:___	bad	(58)
unpleasant ___:___:___:___:___:___:___	pleasant	(59)
satisfying ___:___:___:___:___:___:___	dissatisfying	(60)
worthless ___:___:___:___:___:___:___	valuable	(61)
favorable ___:___:___:___:___:___:___	unfavorable	(62)
annoying ___:___:___:___:___:___:___	pleasing	(63)

very sweet	fairly sweet	slightly sweet	not sweet not bitter	slightly bitter	fairly bitter	very bitter

●

I personally feel that what I would call "SLIGHTLY SWEET" is

good ___:___:___:___:___:___:___	bad	(64)
unpleasant ___:___:___:___:___:___:___	pleasant	(65)
satisfying ___:___:___:___:___:___:___	dissatisfying	(66)
worthless ___:___:___:___:___:___:___	valuable	(67)
favorable ___:___:___:___:___:___:___	unfavorable	(68)
annoying ___:___:___:___:___:___:___	pleasing	(69)

very sweet	fairly sweet	slightly sweet	not sweet not bitter	slightly bitter	fairly bitter	very bitter

●

I personally feel that what I would call "NOT SWEET-NOT BITTER" is

good ___:___:___:___:___:___:___	bad	(70)
unpleasant ___:___:___:___:___:___:___	pleasant	(71)
satisfying ___:___:___:___:___:___:___	dissatisfying	(72)
worthless ___:___:___:___:___:___:___	valuable	(73)
favorable ___:___:___:___:___:___:___	unfavorable	(74)
annoying ___:___:___:___:___:___:___	pleasing	(75)

1-9

very sweet | fairly sweet | slightly sweet | not sweet not bitter | slightly bitter | fairly bitter | very bitter

I personally feel that what I would call "SLIGHTLY BITTER" is

good ___:___:___:___:___:___:___	bad	(76)
unpleasant ___:___:___:___:___:___:___	pleasant	(77)
satisfying ___:___:___:___:___:___:___	dissatisfying	(78)
worthless ___:___:___:___:___:___:___	valuable	(79)
favorable ___:___:___:___:___:___:___	unfavorable	(80)
annoying ___:___:___:___:___:___:___	pleasing	(2: 01)

very sweet | fairly sweet | slightly sweet | not sweet not bitter | slightly bitter | fairly bitter | very bitter

I personally feel that what I would call "FAIRLY BITTER" is

good ___:___:___:___:___:___:___	bad	(2)
unpleasant ___:___:___:___:___:___:___	pleasant	(3)
satisfying ___:___:___:___:___:___:___	dissatisfying	(4)
worthless ___:___:___:___:___:___:___	valuable	(5)
favorable ___:___:___:___:___:___:___	unfavorable	(6)
annoying ___:___:___:___:___:___:___	pleasing	(7)

very sweet | fairly sweet | slightly sweet | not sweet not bitter | slightly bitter | fairly bitter | very bitter

I personally feel that what I would call "VERY BITTER" is

good ___:___:___:___:___:___:___	bad	(8)
unpleasant ___:___:___:___:___:___:___	pleasant	(9)
satisfying ___:___:___:___:___:___:___	dissatisfying	(10)
worthless ___:___:___:___:___:___:___	valuable	(11)
favorable ___:___:___:___:___:___:___	unfavorable	(12)
annoying ___:___:___:___:___:___:___	pleasing	(13)

1-10

many calories	some calories	few calories	no calories

I personally feel that what I would call "MANY CALORIES" is

good ___:___:___:___:___:___:___	bad	(14)
unpleasant ___:___:___:___:___:___:___	pleasant	(15)
satisfying ___:___:___:___:___:___:___	dissatisfying	(16)
worthless ___:___:___:___:___:___:___	valuable	(17)
favorable ___:___:___:___:___:___:___	unfavorable	(18)
annoying ___:___:___:___:___:___:___	pleasing	(19)

many calories	some calories	few calories	no calories

I personally feel that what I would call "SOME CALORIES" is

good ___:___:___:___:___:___:___	bad	(20)
unpleasant ___:___:___:___:___:___:___	pleasant	(21)
satisfying ___:___:___:___:___:___:___	dissatisfying	(22)
worthless ___:___:___:___:___:___:___	valuable	(23)
favorable ___:___:___:___:___:___:___	unfavorable	(24)
annoying ___:___:___:___:___:___:___	pleasing	(25)

many calories	some calories	few calories	no calories

I personally feel that what I would call "FEW CALORIES" is

good ___:___:___:___:___:___:___	bad	(26)
unpleasant ___:___:___:___:___:___:___	pleasant	(27)
satisfying ___:___:___:___:___:___:___	dissatisfying	(28)
worthless ___:___:___:___:___:___:___	valuable	(29)
favorable ___:___:___:___:___:___:___	unfavorable	(30)
annoying ___:___:___:___:___:___:___	pleasing	(31)

1-11

many calories	some calories	few calories	no calories

I personally feel that what I would call "NO CALORIES" is

good ___:___:___:___:___:___:___	bad	(32)
unpleasant ___:___:___:___:___:___:___	pleasant	(33)
satisfying ___:___:___:___:___:___:___	dissatisfying	(34)
worthless ___:___:___:___:___:___:___	valuable	(35)
favorable ___:___:___:___:___:___:___	unfavorable	(36)
annoying ___:___:___:___:___:___:___	pleasing	(37)

DIRECTIONS:

Please sign your name below if you feel you would be willing to participate in the second and third parts of this study:

_____ (38)
your signature

If you would not like to participate further in this study please indicate by signing your name below:

_____ (39)
your signature

THANK YOU VERY MUCH. PLEASE DO NOT DISCUSS THIS STUDY WITH ANYONE ELSE. YOU MAY LEAVE WHEN FINISHED.

Questionnaire #2

Subject No. _____

E # _____ (2: 39)

G # _____ (40)

Your Name _____

Your Social Security Number _____

Your Student Classification _____

Your Local Address _____

_____

Your Telephone Number _____

Dear Student,

Thank you very much for participating in the second part of this research project. As we asked before, PLEASE WORK BY YOURSELF and follow directions CAREFULLY. Remember, there are no right or wrong answers.

There is one additional request for this part of the study. When you have completed a section and move on through the questionnaire, PLEASE DO NOT TURN BACK TO EARLIER PAGES. Doing so will invalidate the results.

Thanks a lot.

Sincerely,

G. L. Sullivan

Gary L. Sullivan,
Experimenter

PLEASE USE PENCIL ON THIS QUESTIONNAIRE. WE HAVE PROVIDED ONE FOR YOU IN THE ENVELOPE. WHEN YOU HAVE FINISHED THE QUESTIONNAIRE REPLACE IT IN THE ENVELOPE. RETURN THE ENVELOPE TO ROOM 207 MATHERLY HALL (Marketing Department) BY 4:30 P.M. TOMORROW. YOU WILL BE INFORMED IN CLASS WHEN TO PICK UP THE THIRD PART OF THE STUDY.

IF YOU HAVE ANY QUESTIONS PLEASE CALL ME AT HOME AT 378-8182.

2-3

PLEASE EXAMINE THE FOLLOWING RESULTS OF A STUDY OF A NEW BRAND OF SOFT DRINK WHICH HAS NOT YET BEEN INTRODUCED TO THE MARKETPLACE.

One hundred people participated in a study of this new soft drink. They rated the product in terms of the same attributes you considered in the first part of this study. The results were as follows:

CITRUS FLAVOR:

Rated as having:

lemon flavor by _____ people.

grapefruit flavor by _____ people.

lemon-lime flavor by _____ people.

no particular citrus flavor by _____ people.

CARBONATION:

Rated as being:

very carbonated by _____ people.

fairly carbonated by _____ people.

slightly carbonated by _____ people.

not at all carbonated by _____ people.

SWEETNESS:

Rated as being:

very sweet by _____ people.

fairly sweet by _____ people.

slightly sweet by _____ people.

not sweet/not bitter by _____ people.

slightly bitter by _____ people.

fairly bitter by _____ people.

very bitter by _____ people.

CALORIE CONTENT:

Rated as having:

many calories by _____ people.

some calories by _____ people.

few calories by _____ people.

no calories by _____ people.

DIRECTIONS:

In this task we are trying to get at your personal assessment of the likelihood of this new soft drink's possessing a level of an attribute. For example, if PRICE were an attribute and there were five price levels (e.g., very low, fairly low, moderate, fairly high, very high) the likelihoods of each level being present in this new soft drink brand might be judged as follows:

PRICE: (In pencil, circle the number of chances in ten you think each level has of occurring.)

very low price -	0	1	2	(3)	4	5	6	7	8	9	10
fairly low price -	0	1	2	3	4	5	6	(7)	8	9	10
moderate price -	(0)	1	2	3	4	5	6	7	8	9	10
fairly high price -	(0)	1	2	3	4	5	6	7	8	9	10
very high price -	(0)	1	2	3	4	5	6	7	8	9	10

NEXT, ADD UP THE NUMBERS YOU CIRCLED ABOVE: (3 + 7 + 0 + 0 + 0) = 10)

If the TOTAL does not add up to TEN EXACTLY, go back and make changes until the sum equals ten and the circled numbers accurately represent the number of chances in ten you believe each level of the attribute has a chance of occurring in this new soft drink.

WORK SLOWLY AND CAREFULLY ON THIS SECTION. YOU MAY TURN BACK TO THIS PAGE TO REFRESH YOUR MEMORY ON HOW TO PERFORM THIS TASK, HOWEVER, DO NOT LOOK BACK AT ANY OTHER SECTIONS.

TO ASSIST YOU IN THIS TASK YOU MAY, IF YOU WISH, USE THE COLORED INFORMATION SHEET INSIDE THE QUESTIONNAIRE ENVELOPE. THIS SHEET IS FOLDED IN HALF AND STAPLED SHUT. BREAK THE STAPLE AND USE THE INFORMATION INSIDE FOR THE REMAINDER OF THE SECTIONS OF THIS QUESTIONNAIRE. WHEN YOU HAVE LOCATED THIS INFORMATION SHEET YOU MAY CONTINUE WITH THE STUDY.

CITRUS FLAVOR: (In pencil, circle the number of chances in ten you think each level has of occurring.)

lemon flavor -	0	1	2	3	4	5	6	7	8	9	10	(41)
grapefruit flavor -	0	1	2	3	4	5	6	7	8	9	10	(42)
lemon-lime flavor -	0	1	2	3	4	5	6	7	8	9	10	(43)
no particular citrus flavor -	0	1	2	3	4	5	6	7	8	9	10	(44)

ADD UP CIRCLED NUMBERS: (+ + + = _____)
total

Total must equal ten. If not, go back and make necessary changes above. If total equals ten move on to the next item.

CARBONATION: (In pencil, circle the number of chances in ten you think each level has of occurring)

very carbonated -	0	1	2	3	4	5	6	7	8	9	10	(45)
fairly carbonated -	0	1	2	3	4	5	6	7	8	9	10	(46)
slightly carbon. -	0	1	2	3	4	5	6	7	8	9	10	(47)
not carbonated at all -	0	1	2	3	4	5	6	7	8	9	10	(48)

ADD UP CIRCLED NUMBERS: (+ + + + = _____)
total

Total must equal ten. If not, go back and make necessary changes above. If total equals ten move on to the next item.

SWEETNESS: (In pencil, circle the number of chances in ten you think each level has of occurring)

very sweet -	0	1	2	3	4	5	6	7	8	9	10	(49)
fairly sweet -	0	1	2	3	4	5	6	7	8	9	10	(50)
slightly sweet -	0	1	2	3	4	5	6	7	8	9	10	(51)
not sweet/ not bitter -	0	1	2	3	4	5	6	7	8	9	10	(52)
slightly bitter -	0	1	2	3	4	5	6	7	8	9	10	(53)
fairly bitter -	0	1	2	3	4	5	6	7	8	9	10	(54)
very bitter -	0	1	2	3	4	5	6	7	8	9	10	(55)

ADD UP CIRCLED NUMBERS: (+ + + + + + = _____)
total

Total must equal ten. If not, go back and make necessary changes above. If total equals ten move on to the next item.

CALORIE CONTENT: (In pencil, circle the number of chances in ten you think each level has of occurring)

many calories -	0	1	2	3	4	5	6	7	8	9	10	(56)
some calories -	0	1	2	3	4	5	6	7	8	9	10	(57)
few calories -	0	1	2	3	4	5	6	7	8	9	10	(58)
no calories -	0	1	2	3	4	5	6	7	8	9	10	(59)

ADD UP CIRCLED NUMBERS: (+ + + = _____)
total

Total must equal ten. If not, go back and make necessary changes above. IF TOTAL EQUALS TEN MOVE ON TO NEXT SECTION.

DIRECTIONS:

For each of the attributes of soft drink products we would like you to construct a sentence describing this new brand of soft drink using ONE of the levels of each of the attributes.

For example, if PRICE were an attribute the following sentences might be written by different individuals:

PRICE:

very low	fairly low	moderate	fairly high	very high

"This new soft drink is fairly high priced."

OR

"This new soft drink tastes better than other moderate priced brands."

OR

"I think this drink is NOT very low priced."

When you have completed writing your sentence for each attribute in the space indicated, please circle the attribute level you used. YOU SHOULD CIRCLE THE ATTRIBUTE LEVEL WHERE IT HAS BEEN PRINTED ABOVE THE SPACE WHERE YOU WROTE YOUR SENTENCE.

FOR EXAMPLE, if you had written the last sentence quoted above, YOU WOULD CIRCLE YOUR ATTRIBUTE LEVEL AS FOLLOWS:

PRICE:

(very low)	fairly low	moderate	fairly high	very high

ONCE YOU HAVE CIRCLED THE ATTRIBUTE LEVEL YOU USED IN YOUR SENTENCE YOU SHOULD TRANSFER IT TO THE BLANK SPACE IN THE SENTENCE BELOW THE SPOT WHERE YOU WROTE YOUR SENTENCE.

FOR EXAMPLE, if you circled VERY LOW you would insert it into the blank like so:

"This new soft drink is ____VERY LOW_____ in price."

NEXT, YOU WOULD COMPLETE THE SCALES WHICH FOLLOW IMMEDIATELY AFTER THE SENTENCE WHERE YOU FILLED IN THE BLANK. THE SCALES REFER ONLY TO THE STATEMENT MADE BY THAT SENTENCE AND ARE OF THE FOLLOWING TYPE:

likely ___:___:___:___:___:___:___:___ unlikely

improbable ___:___:___:___:___:___:___:___ probable

IT IS IMPORTANT THAT YOU PLACE A MARK "X" ON THE LINE OF EACH SCALE SO THAT IT ACCURATELY REFLECTS YOUR FEELINGS ABOUT THE STATEMENT. DO NOT PLACE MORE THAN ONE "X" ON EACH LINE. ALSO, BE SURE TO PLACE YOUR "X" IN THE MIDDLE OF THE SPACE AND NOT ON THE BOUNDARY BETWEEN SPACES.

IF YOU HAVE PROBLEMS IN COMPLETING THIS TASK YOU MAY REFER BACK TO THESE INSTRUCTIONS IF NECESSARY. HOWEVER, DO NOT LOOK BACK TO ANY OTHER SECTION YOU HAVE COMPLETED.

CITRUS FLAVOR:

lemon flavor	grapefruit flavor	lemon-lime flavor	no particular citrus flavor

Your sentence using ONE level of the attribute:

Circle the level of the attribute you used in your sentence, ABOVE. (from the set printed immediately below CITRUS FLAVOR) Insert that SAME LEVEL in the sentence below. After doing this complete the scales which refer to this new sentence.

This new soft drink has _____. (60)

likely ___:___:___:___:___:___:___ unlikely (61)

improbable ___:___:___:___:___:___:___ probable (62)

CARBONATION:

very carbonated	fairly carbonated	slightly carbonated	not at all carbonated

Your sentence using ONE level of the attribute:

Circle the level of the attribute you used in your sentence, ABOVE. (from the set printed immediately below CARBONATION) Insert that SAME LEVEL in the sentence below. After doing this complete the scales which refer to this new sentence.

This new soft drink is _____. (63)

likely ___:___:___:___:___:___:___ unlikely (64)

improbable ___:___:___:___:___:___:___ probable (65)

CONTINUE

SWEETNESS:

very sweet	fairly sweet	slightly sweet	not sweet not bitter	slightly bitter	fairly bitter	very bitter

Your sentence using ONE level of the attribute:

Circle the level of the attribute you used in your sentence, ABOVE. (from the set printed immediately below SWEETNESS) Insert that SAME LEVEL in the sentence below. After doing this complete the scales which refer to this new sentence.

This new soft drink is _____. (66)

likely ____:____:____:____:____:____:____ unlikely (67)

improbable ____:____:____:____:____:____:____ probable (68)

CALORIE CONTENT:

many calories	some calories	few calories	no calories

Your sentence using ONE level of the attribute:

Circle the level of the attribute you used in your sentence, ABOVE. (from the set printed immediately below CALORIE CONTENT) Insert that SAME LEVEL in the sentence below. After doing this complete the scales which refer to this new sentence.

This new soft drink has _____. (69)

likely ____:____:____:____:____:____:____ unlikely (70)

improbable ____:____:____:____:____:____:____ probable (71)

CONTINUE ON TO NEXT SECTION

DIRECTIONS:

We are interested in your judgment of this new soft drink.

Here is how you are to use the following scales in judging the brand of soft drink involved in the study.

If you feel that the brand is very closely related to one end of the scale, you should place your check-mark as follows:

unpleasant _X_:___:___:___:___:___:___ pleasant

OR

unpleasant ___:___:___:___:___:___:_X_ pleasant

If you feel that the brand is quite closely related to one or the other end of the scale (but not extremely), you should place your check-mark as follows:

good ___:_X_:___:___:___:___:___ bad

good ___:___:___:___:___:_X_:___ bad

If the brand seems only slightly related to one side as opposed to the other side (but is not really neutral), then you should check as follows:

satisfying ___:___:_X_:___:___:___:___ dissatisfying

satisfying ___:___:___:___:_X_:___:___ dissatisfying

The direction toward which you check, of course, depends upon which of the two ends of the scale seem more characteristic of your feeling toward the brand.

If you consider the brand to be neutral on the scale, both sides of the scale equally associated with the brand, or if you feel completely indifferent toward the brand, then you should place your check-mark in the middle space:

good ___:___:___:_X_:___:___:___ bad

IMPORTANT: (1) Place your check-marks in the middle of the spaces not on the boundaries.

THIS	NOT THIS
___:___:_X_:___:___:___:___	___:___:___:_X_:___:___:___

(2) Never put more than one check-mark on a single scale.

Do not worry or puzzle over individual items. It is your first impression, the immediate "feelings" about the items, that we want. On the other hand, please do not be careless, because we want your true impressions.

In this study we are interested in soft drinks as refreshments, and not, for example, in mixed drinks.

My feeling is that this new brand of soft drink is:

good	___	___	___	___	___	___	___	bad (72)
heavy	___	___	___	___	___	___	___	light (73)
unpleasant	___	___	___	___	___	___	___	pleasant (74)
unusual	___	___	___	___	___	___	___	usual (75)
tasty	___	___	___	___	___	___	___	distasteful (76)
fresh	___	___	___	___	___	___	___	stale (77)
dissatisfying	___	___	___	___	___	___	___	satisfying (78)
weak	___	___	___	___	___	___	___	strong (79)
valuable	___	___	___	___	___	___	___	worthless (80)
hot	___	___	___	___	___	___	___	cold (3: 01)
annoying	___	___	___	___	___	___	___	pleasing (2)

THANK YOU VERY MUCH. YOU HAVE NOW COMPLETED TWO OF THE THREE QUESTIONNAIRES REQUIRED FOR THIS STUDY. PLEASE TURN BACK TO THE COVER LETTER (second sheet) FOR INSTRUCTIONS IN RETURNING THIS QUESTIONNAIRE.

Questionnaire #3 Subject No. _____

Your Name _____

Your Social Security Number _____

Your Student Classification _____

Your Local Address _____

_____

Your Telephone Number _____

Dear Student,

Thank you very much for agreeing to participate in the third and final part of this research project. As we asked before, PLEASE WORK BY YOURSELF AND FOLLOW DIRECTIONS CAREFULLY. Remember, there are no right or wrong answers.

There is one additional request for this part of the study. When you have completed a section and move on through the questionnaire, PLEASE DO NOT TURN BACK TO EARLIER PAGES. Doing so will invalidate the results.

Thanks a lot.

Sincerely,

G. L. Sullivan

Gary L. Sullivan,
Experimenter

PLEASE USE PENCIL ON THIS QUESTIONNAIRE. WE HAVE PROVIDED ONE FOR YOUR USE IN THIS ENVELOPE. WHEN YOU HAVE FINISHED THE QUESTIONNAIRE RETURN IT TO ROOM 207 MATHERLY HALL (Marketing Department) BY 4:30 P.M. TOMORROW. PAYMENT ARRANGEMENTS WILL BE ANNOUNCED IN CLASS.

IF YOU HAVE ANY QUESTIONS PLEASE CALL ME AT HOME AT 378-8182.

PLEASE EXAMINE CAREFULLY THE FOLLOWING RESULTS OF A MORE RECENT STUDY OF THIS NEW SOFT DRINK.

Upon analysis of the demographic characteristics of the participants in the previous study we discovered that the research results we gave earlier came from a study of a sample of individuals which was not particularly representative of the general population. In fact, more than half of the respondents were elderly and all were confined to a nursing home for various physical disabilities. However, we do have the results of another study conducted on one hundred undergraduate students at the University of Florida. They rated the product in terms of the same attributes which were considered by the people in the previous study. The results were as follows:

CITRUS FLAVOR:

Rated as having:

lemon flavor by _____ students.

grapefruit flavor by _____ students.

lemon-lime flavor by _____ students.

no particular citrus flavor by _____ students.

CARBONATION:

Rated as being:

very carbonated by _____ students.

fairly carbonated by _____ students.

slightly carbonated by _____ students.

not at all carbonated by _____ students.

SWEETNESS:

Rated as being:

very sweet by _____ students.

fairly sweet by _____ students.

slightly sweet by _____ students.

not sweet/not bitter by _____ students.

slightly bitter by _____ students.

fairly bitter by _____ students.

very bitter by _____ students.

CALORIE CONTENT:

Rated as having:

many calories by _____ students.

some calories by _____ students.

few calories by _____ students.

no calories by _____ students.

CONTINUE ON TO NEXT SECTION

DIRECTIONS:

In this task we are trying to get at your personal assessment of the likelihood of this new soft drink's possessing a level of an attribute. For example, if PRICE were an attribute and there were five price levels (e.g., very low, fairly low, moderate, fairly high, very high) the likelihoods of each level being present in this new soft drink brand might be judged as follows:

PRICE: (In pencil, circle the number of chances in ten you think each level has of occurring)

very low price - 0 1 2 (3) 4 5 6 7 8 9 10

fairly low price - 0 1 2 3 4 5 6 (7) 8 9 10

moderate price - (0) 1 2 3 4 5 6 7 8 9 10

fairly high price - (0) 1 2 3 4 5 6 7 8 9 10

very high price - (0) 1 2 3 4 5 6 7 8 9 10

NEXT, ADD UP THE NUMBERS YOU CIRCLED ABOVE: (3 + 7 + 0 + 0 + 0 = 10)

If the TOTAL does not add up to TEN EXACTLY, go back and make changes until the sum equals ten and the circled numbers accurately represent the number of chances in ten you believe each level of the attribute has a chance of occurring in this new soft drink.

WORK SLOWLY AND CAREFULLY ON THIS SECTION. YOU MAY TURN BACK TO THIS PAGE TO REFRESH YOUR MEMORY ON HOW TO PERFORM THIS TASK. HOWEVER, DO NOT LOOK BACK AT ANY OTHER SECTIONS.

TO ASSIST YOU IN THIS TASK YOU MAY, IF YOU WISH, USE THE COLORED INFORMATION SHEET INSIDE THE QUESTIONNAIRE ENVELOPE. THIS SHEET IS FOLDED IN HALF AND STAPLED SHUT. BREAK THE STAPLE AND USE THE INFORMATION INSIDE FOR THE REMAINDER OF THE SECTIONS OF THIS QUESTIONNAIRE. WHEN YOU HAVE LOCATED THIS INFORMATION SHEET YOU MAY CONTINUE WITH THE STUDY.

CITRUS FLAVOR: (In pencil, circle the number of chances in ten you think each level has of occurring)

lemon flavor - 0 1 2 3 4 5 6 7 8 9 10

grapefruit flavor - 0 1 2 3 4 5 6 7 8 9 10

lemon-lime flavor - 0 1 2 3 4 5 6 7 8 9 10

no particular citrus flavor - 0 1 2 3 4 5 6 7 8 9 10

ADD UP CIRCLED NUMBERS (+ + + = _____)
total

Total must equal ten. If not, go back and make necessary changes above. If total equals ten move on to the next item.

CARBONATION: (In pencil, circle the number of chances in ten you think each level has of occurring)

very carbonated -	0	1	2	3	4	5	6	7	8	9	10	(7)
fairly carbonated -	0	1	2	3	4	5	6	7	8	9	10	(8)
slightly carbon. -	0	1	2	3	4	5	6	7	8	9	10	(9)
not carbonated at all -	0	1	2	3	4	5	6	7	8	9	10	(10)

ADD UP CIRCLED NUMBERS: (+ + + + = _____)
total

Total must equal ten. If not, go back and make necessary changes above. If total equals ten move on to the next item.

SWEETNESS: (In pencil, circle the number of chances in ten you think each level has of occurring)

very sweet -	0	1	2	3	4	5	6	7	8	9	10	(11)
fairly sweet -	0	1	2	3	4	5	6	7	8	9	10	(12)
slightly sweet -	0	1	2	3	4	5	6	7	8	9	10	(13)
not sweet/ not bitter -	0	1	2	3	4	5	6	7	8	9	10	(14)
slightly bitter -	0	1	2	3	4	5	6	7	8	9	10	(15)
fairly bitter -	0	1	2	3	4	5	6	7	8	9	10	(16)
very bitter -	0	1	2	3	4	5	6	7	8	9	10	(17)

ADD UP CIRCLED NUMBERS: (+ + + + + + + = _____)
total

Total must equal ten. If not, go back and make necessary changes above. If total equals ten move on to the next item.

CALORIE CONTENT: (In pencil, circle the number of chances in ten you think each level has of occurring)

many calories -	0	1	2	3	4	5	6	7	8	9	10	(18)
some calories -	0	1	2	3	4	5	6	7	8	9	10	(19)
few calories -	0	1	2	3	4	5	6	7	8	9	10	(20)
no calories -	0	1	2	3	4	5	6	7	8	9	10	(21)

ADD UP CIRCLED NUMBERS: (+ + + = _____)
total

Total must equal ten. If not, go back and make necessary changes above. IF TOTAL EQUALS TEN MOVE ON TO NEXT SECTION.

DIRECTIONS:

For each of the attributes of soft drink products we would like you to construct a sentence describing this new brand of soft drink using ONE of the levels of each of the attributes.

For example, if PRICE were an attribute the following sentences might be written by different individuals:

PRICE:

very low	fairly low	moderate	fairly high	very high

"This new soft drink is fairly high priced."

OR

"This new soft drink tastes better than other moderate priced brands."

OR

"I think this drink is NOT very low priced."

When you have completed writing your sentence for each attribute in the space indicated, please circle the attribute level you used. YOU SHOULD CIRCLE THE ATTRIBUTE LEVEL WHERE IT HAS BEEN PRINTED ABOVE THE SPACE WHERE YOU WROTE YOUR SENTENCE.

FOR EXAMPLE, if you had written the last sentence quoted above, YOU WOULD CIRCLE YOUR ATTRIBUTE LEVEL AS FOLLOWS:

PRICE:

(very low)	fairly low	moderate	fairly high	very high

ONCE YOU HAVE CIRCLED THE ATTRIBUTE LEVEL YOU USED IN YOUR SENTENCE YOU SHOULD TRANSFER IT TO THE BLANK SPACE IN THE SENTENCE BELOW THE SPOT WHERE YOU WROTE YOUR SENTENCE.

FOR EXAMPLE, if you circled VERY LOW you would insert it into the blank like so:

"This new soft drink is _____VERY LOW_____ in price."

NEXT, YOU WOULD COMPLETE THE SCALES WHICH FOLLOW IMMEDIATELY AFTER THE SENTENCE WHERE YOU FILLED IN THE BLANK. THE SCALES REFER ONLY TO THE STATEMENT MADE BY THAT SENTENCE AND ARE OF THE FOLLOWING TYPE:

likely ___:___:___:___:___:___:___ unlikely

improbable ___:___:___:___:___:___:___ probable

IT IS IMPORTANT THAT YOU PLACE A MARK "X" ON THE LINE OF EACH SCALE SO THAT IT ACCURATELY REFLECTS YOUR FEELINGS ABOUT THE STATEMENT. DO NOT PLACE MORE THAN ONE "X" ON EACH LINE. ALSO, BE SURE TO PLACE YOUR "X" IN THE MIDDLE OF THE SPACE AND NOT ON THE BOUNDARY BETWEEN SPACES.

IF YOU HAVE PROBLEMS IN COMPLETING THIS TASK YOU MAY REFER BACK TO THESE INSTRUCTIONS IF NECESSARY. HOWEVER, DO NOT LOOK BACK TO ANY OTHER SECTION YOU HAVE COMPLETED.

CITRUS FLAVOR:

lemon flavor	grapefruit flavor	lemon-lime flavor	no particular citrus flavor

Your sentence using ONE level of the attribute:

Circle the level of the attribute you used in your sentence, ABOVE, (from the set printed immediately below CITRUS FLAVOR) Insert that SAME LEVEL in the sentence below. After doing this complete the scales which refer to this new sentence.

This new soft drink has _____. (22)

likely ___:___:___:___:___:___:___ unlikely (23)

improbable ___:___:___:___:___:___:___ probable (24)

CARBONATION:

very carbonated	fairly carbonated	slightly carbonated	not at all carbonated

Your sentence using ONE level of the attribute:

Circle the level of the attribute you used in your sentence, ABOVE. (from the set printed immediately below CARBONATION) Insert that SAME LEVEL in the sentence below. After doing this complete the scales which refer to this new sentence.

This new soft drink is _____. (25)

likely ___:___:___:___:___:___:___ unlikely (26)

improbable ___:___:___:___:___:___:___ probable (27)

SWEETNESS:

very sweet	fairly sweet	slightly sweet	not sweet not bitter	slightly bitter	fairly bitter	very bitter

Your sentence using ONE level of the attribute:

Circle the level of the attribute you used in your sentence, ABOVE. (from the set printed immediately below SWEETNESS) Insert that SAME LEVEL in the sentence below. After doing this complete the scales which refer to this new sentence.

This new soft drink is _____. (28)

likely ___:___:___:___:___:___:___ unlikely (29)

improbable ___:___:___:___:___:___:___ probable (30)

CALORIE CONTENT:

many calories	some calories	few calories	no calories

Your sentence using ONE level of the attribute:

Circle the level of the attribute you used in your sentence, ABOVE. (from the set printed immediately below CALORIE CONTENT) Insert that SAME LEVEL in the sentence below. After doing this complete the scales which refer to this new sentence.

This new soft drink has _____. (31)

likely ___:___:___:___:___:___:___ unlikely (32)

improbable ___:___:___:___:___:___:___ probable (33)

CONTINUE ON TO NEXT SECTION

We are interested in your judgements of certain characteristics of soft drinks. When we evaluate such characteristics, we do so on the basis of what they represent or mean to us.

Here is how you are to use the following scales in judging product characteristics involved in the study:

If you feel that the product characteristic above the scales is very closely related to one end of the scale, you should place your check-mark as follows:

unpleasant _X_:___:___:___:___:___:___ pleasant

OR

unpleasant ___:___:___:___:___:___:_X_ pleasant

If you feel that the product characteristic is quite closely related to one or the other end of the scale (but not extremely), you should place your check-mark as follows:

good ___:_X_:___:___:___:___:___ bad

OR

good ___:___:___:___:___:_X_:___ bad

If the product characteristic seems only slightly related to one side as opposed to the other side (but is not really neutral), then you should check as follows:

satisfying ___:___:_X_:___:___:___:___ dissatisfying

OR

satisfying ___:___:___:___:_X_:___:___ dissatisfying

The direction toward which you check, of course, depends upon which of the two ends of the scale seem more characteristic of your feeling toward the characteristic you're judging.

If you consider the product characteristic to be neutral on the scale, both sides of the scale equally associated with the characteristic, or if you feel completely indifferent toward the characteristic, then you should place your check-mark in the middle space.

good ___:___:___:_X_:___:___:___ bad

IMPORTANT: (1) Place your check-marks in the middle of spaces not on the boundaries.

THIS NOT THIS

___:___:_X_:___:___x___:___

(2) Be sure you check every scale for every product characteristic - do not omit any.

(3) Never put more than one check-mark on a single scale.

Do not worry or puzzle over individual items. It is your first impression, the immediate "feelings" about the items, that we want. On the other hand, please do not be careless, because we want your true impressions.

In this study we are interested in soft drinks as refreshments, and not, for example, in mixed drinks.

lemon flavor	grapefruit flavor	lemon-lime flavor	no particular citrus flavor

I personally feel that what I would call "LEMON FLAVOR" is

good ___:___:___:___:___:___:___	bad	(34)
unpleasant ___:___:___:___:___:___:___	pleasant	(35)
satisfying ___:___:___:___:___:___:___	dissatisfying	(36)

lemon flavor	grapefruit flavor	lemon-lime flavor	no particular citrus flavor

I personally feel that what I would call "GRAPEFRUIT FLAVOR" is

good ___:___:___:___:___:___:___	bad	(37)
unpleasant ___:___:___:___:___:___:___	pleasant	(38)
satisfying ___:___:___:___:___:___:___	dissatisfying	(39)

lemon flavor	grapefruit flavor	lemon-lime flavor	no particular citrus flavor

I personally feel that what I would call "LEMON-LIME FLAVOR" is

good ___:___:___:___:___:___:___	bad	(40)
unpleasant ___:___:___:___:___:___:___	pleasant	(41)
satisfying ___:___:___:___:___:___:___	dissatisfying	(42)

lemon flavor	grapefruit flavor	lemon-lime flavor	no particular citrus flavor

I personally feel that what I would call "NO PARTICULAR CITRUS FLAVOR" is

good ___:___:___:___:___:___:___	bad	(43)
unpleasant ___:___:___:___:___:___:___	pleasant	(44)
satisfying ___:___:___:___:___:___:___	dissatisfying	(45)

very carbonated	fairly carbonated	slightly carbonated	not at all carbonated

I personally feel that what I would call "VERY CARBONATED" is

good ___:___:___:___:___:___:___ bad	(46)
unpleasant ___:___:___:___:___:___:___ pleasant	(47)
satisfying ___:___:___:___:___:___:___ dissatisfying	(48)

very carbonated	fairly carbonated	slightly carbonated	not at all carbonated

I personally feel that what I would call "FAIRLY CARBONATED" is

good ___:___:___:___:___:___:___ bad	(49)
unpleasant ___:___:___:___:___:___:___ pleasant	(50)
satisfying ___:___:___:___:___:___:___ dissatisfying	(51)

very carbonated	fairly carbonated	slightly carbonated	not at all carbonated

I personally feel that what I would call "SLIGHTLY CARBONATED" is

good ___:___:___:___:___:___:___ bad	(52)
unpleasant ___:___:___:___:___:___:___ pleasant	(53)
satisfying ___:___:___:___:___:___:___ dissatisfying	(54)

very carbonated	fairly carbonated	slightly carbonated	not at all carbonated

I personally feel that what I would call "NOT AT ALL CARBONATED" is

good ___:___:___:___:___:___:___ bad	(55)
unpleasant ___:___:___:___:___:___:___ pleasant	(56)
satisfying ___:___:___:___:___:___:___ dissatisfying	(57)

3-13

very sweet	fairly sweet	slightly sweet	not sweet not bitter	slightly bitter	fairly bitter	very bitter

I personally feel that what I would call "VERY SWEET" is

good ___:___:___:___:___:___:___ bad	(58)
unpleasant ___:___:___:___:___:___:___ pleasant	(59)
satisfying ___:___:___:___:___:___:___ dissatisfying	(60)

very sweet	fairly sweet	slightly sweet	not sweet not bitter	slightly bitter	fairly bitter	very bitter

I personally feel that what I would call "FAIRLY SWEET" is

good ___:___:___:___:___:___:___ bad	(61)
unpleasant ___:___:___:___:___:___:___ pleasant	(62)
satisfying ___:___:___:___:___:___:___ dissatisfying	(63)

very sweet	fairly sweet	slightly sweet	not sweet not bitter	slightly bitter	fairly bitter	very bitter

I personally feel that what I would call "SLIGHTLY SWEET" is

good ___:___:___:___:___:___:___ bad	(64)
unpleasant ___:___:___:___:___:___:___ pleasant	(65)
satisfying ___:___:___:___:___:___:___ dissatisfying	(66)

very sweet	fairly sweet	slightly sweet	not sweet not bitter	slightly bitter	fairly bitter	very bitter

I personally feel that what I would call "NOT SWEET-NOT BITTER" is

good ___:___:___:___:___:___:___ bad	(67)
unpleasant ___:___:___:___:___:___:___ pleasant	(68)
satisfying ___:___:___:___:___:___:___ dissatisfying	(69)

3-14

very sweet	fairly sweet	slightly sweet	not sweet not bitter	slightly bitter	fairly bitter	very bitter

I personally feel that what I would call
"SLIGHTLY BITTER" is

good ___:___:___:___:___:___:___ bad (70)

unpleasant ___:___:___:___:___:___:___ pleasant (71)

satisfying ___:___:___:___:___:___:___ dissatisfying (72)

very sweet	fairly sweet	slightly sweet	not sweet not bitter	slightly bitter	fairly bitter	very bitter

I personally feel that what I would call
"FAIRLY BITTER" is

good ___:___:___:___:___:___:___ bad (73)

unpleasant ___:___:___:___:___:___:___ pleasant (74)

satisfying ___:___:___:___:___:___:___ dissatisfying (75)

very sweet	fairly sweet	slightly sweet	not sweet not bitter	slightly bitter	fairly bitter	very bitter

I personally feel that what I would call
"VERY BITTER" is

good ___:___:___:___:___:___:___ bad (76)

unpleasant ___:___:___:___:___:___:___ pleasant (77)

satisfying ___:___:___:___:___:___:___ dissatisfying (78)

many calories	some calories	few calories	no calories

I personally feel that what I would call "MANY CALORIES" is

good ___:___:___:___:___:___:___ bad (79)

unpleasant ___:___:___:___:___:___:___ pleasant (80)

satisfying ___:___:___:___:___:___:___ dissatisfying (4:01)

many calories	some calories	few calories	no calories

I personally feel that what I would call "SOME CALORIES" is

good ___:___:___:___:___:___:___ bad (2)

unpleasant ___:___:___:___:___:___:___ pleasant (3)

satisfying ___:___:___:___:___:___:___ dissatisfying (4)

many calories	some calories	few calories	no calories

I personally feel that what I would call "FEW CALORIES" is

good ___:___:___:___:___:___:___ bad (5)

unpleasant ___:___:___:___:___:___:___ pleasant (6)

satisfying ___:___:___:___:___:___:___ dissatisfying (7)

many calories	some calories	few calories	no calories

I personally feel that what I would call "NO CALORIES" is

good ___:___:___:___:___:___:___ bad (8)

unpleasant ___:___:___:___:___:___:___ pleasant (9)

satisfying ___:___:___:___:___:___:___ dissatisfying (10)

3-16

DIRECTIONS:

We are interested in your judgment of this new soft drink.

Here is how you are to use the following scales in judging the brand of soft drink involved in the study.

If you feel that the brand is very closely related to one end of the scale, you should place your check-mark as follows:

unpleasant _X_:___:___:___:___:___:___ pleasant

OR

unpleasant ___:___:___:___:___:___:_X_ pleasant

If you feel that the brand is quite closely related to one or the other end of the scale (but not extremely), you should place your check-mark as follows:

good ___:_X_:___:___:___:___:___ bad

OR

good ___:___:___:___:___:_X_:___ bad

If the brand seems only slightly related to one side as opposed to the other side (but is not really neutral), then you should check as follows:

satisfying ___:___:_X_:___:___:___:___ dissatisfying

satisfying ___:___:___:___:_X_:___:___ dissatisfying

The direction toward which you check, of course, depends upon which of the two ends of the scale seem more characteristic of your feeling toward the brand.

If you consider the brand to be neutral on the scale, both sides of the scale equally associated with the brand, or if you feel completely indifferent toward the brand, then you should place your check-mark in the middle space:

good ___:___:___:_X_:___:___:___ bad

IMPORTANT: (1) Place your check-marks in the middle of the spaces not on the boundaries.

THIS NOT THIS

___:___:_X_:___:_X_:___

(2) Never put more than one check-mark on a single scale.

Do not worry or puzzle over individual items. It is your first impression, the immediate "feelings" about the items, that we want. On the other hand, please do not be careless, because we want your true impressions.

In this study we are interested in soft drinks as refreshments, and not, for example, in mixed drinks.

My feeling is that this new brand of soft drink is:

good	___:___:___:___:___:___:___	bad (11)
heavy	___:___:___:___:___:___:___	light (12)
unpleasant	___:___:___:___:___:___:___	pleasant (13)
unusual	___:___:___:___:___:___:___	usual (14)
tasty	___:___:___:___:___:___:___	distasteful (15)
fresh	___:___:___:___:___:___:___	stale (16)
dissatisfying	___:___:___:___:___:___:___	satisfying (17)
weak	___:___:___:___:___:___:___	strong (18)
valuable	___:___:___:___:___:___:___	worthless (19)
hot	___:___:___:___:___:___:___	cold (20)
annoying	___:___:___:___:___:___:___	pleasing (21)

DO YOU THINK YOU COULD DESCRIBE THE PURPOSE OF THE RESEARCH YOU HAVE JUST PARTICIPATED IN? IN A FEW SENTENCES, PLEASE TRY.

THANK YOU VERY MUCH. YOU HAVE NOW COMPLETED ALL OF THE QUESTIONNAIRES REQUIRED IN THIS STUDY. PLEASE TURN BACK TO THE COVER LETTER (second sheet) FOR INSTRUCTIONS IN RETURNING THIS QUESTIONNAIRE. PAYMENT ARRANGEMENTS FOR YOUR PARTICIPATION WILL BE ANNOUNCED IN CLASS.

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BIOGRAPHICAL SKETCH

Gary Lloyd Sullivan was born in Lynn, Massachusetts, on November 22, 1950. He received his early education in the Lynnfield Public Schools. His high school studies were undertaken at Cardinal Cushing Academy in West Newbury, Massachusetts, where he graduated as Salutatorian of his class in 1968.

Gary enrolled at the Lowell Technological Institute in Lowell, Massachusetts, in September, 1968. He received the Bachelor of Science degree in Industrial Management in 1972. He continued his education immediately after graduation by entering the Master of Business Administration program at Florida Atlantic University in Boca Raton, Florida. The M.B.A. was awarded in 1973.

After obtaining his M.B.A., Gary accepted a position with the Beistle Company of Shippensburg, Pennsylvania, where he served as Production Manager. After one year at the Beistle Company, he decided to resume his education with the specific intention of obtaining doctoral training in the marketing area.

In September of 1974, he enrolled in the Ph.D. program at the University of Florida. He resided in Gainesville until September, 1977, when he accepted the position of Assistant Professor of Business Administration at the University of Kentucky in Lexington. He was awarded the degree of Doctor of Philosophy in Business Administration in August, 1978.

Gary is a member of the Honor Society of Phi Kappa Phi and holds professional memberships in the American Marketing Association and the Association for Consumer Research.

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Olli T. Ahtola, Chairman
Assistant Professor of Marketing

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

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I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

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This dissertation was submitted to the Graduate Faculty of the Department of Marketing in the College of Business Administration and to the Graduate Council, and was accepted as partial fulfillment of the requirements for the degree of Doctor of Philosophy.

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